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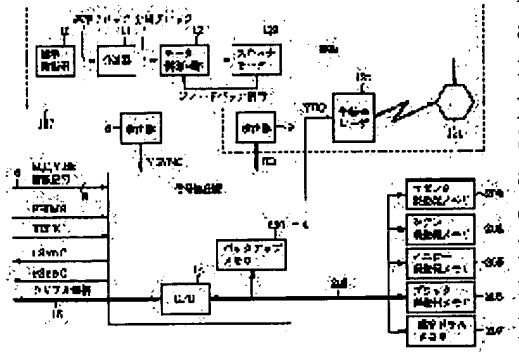
# (54) IMAGE FORMING DEVICE AND CONSUMABLE MATERIAL CONTROL METHOD FOR THE DEVICE



(57)Abstract:

PROBLEM TO BE SOLVED: To individually recognize each unit to be consumed in execution of an image forming sequence so as to clearly show a user whether replacement is necessary or not by detachably providing a plurality of units equipped with nonvolatile memories for storing attribute information for recognizing a predetermined consumable material and its using state.

SOLUTION: In a CPU 14 for synchronously controlling a printer controller in a signal processor 4 and an action of a printer engine, developing machine memories 203-206 which store the number of times of reuse, ID number, forecasted remaining service life and a photosensitive drum memory 207 are provided, and communication is performed through a backup memory 230 and a serial communication line 202. At each printing, the contents of the developing memories 203-206 and the photosensitive drum memory 207 are renewed. The contents of each memory is sent to the printer controller through a serial communication 15, from which it is displayed on a monitor of a host computer as a user terminal through a network.

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CLAIMS

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[Claim(s)]
[Claim 1] Image formation equipment characterized by constituting two or more units equipped with the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition free [ attachment and detachment ] on the body of image formation equipment.
[Claim 2] Image formation equipment according to claim 1 characterized by providing the following. The 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit The judgment means which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement An information means to report the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious
[Claim 3] Image formation equipment according to claim 2 characterized by providing the 1st control means which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged, and updates the attribute information on said 2nd non-volatile storage means when it judges with said judgment means being inharmonious.
[Claim 4] Said information means is image formation equipment according to claim 2 characterized by displaying the unit candidate by whom it was exchanged on a control panel.
[Claim 5] Said information means is image formation equipment according to claim 2 characterized by notifying the unit candidate by whom it was exchanged to an external device, and indicating by external.
[Claim 6] Said information means is image formation equipment according to claim 2 characterized by printing and outputting the unit candidate by whom it was exchanged to a record medium.
[Claim 7] Any one unit is image formation equipment according to claim 1 characterized by being the development unit which develops the latent image formed in image support.
[Claim 8] Any one unit is image formation equipment according to claim 1 characterized by being the development unit which develops the latent image formed in image support a color exception.
[Claim 9] Any one unit is image formation equipment according to claim 1 characterized by being the photo conductor unit by which a photo conductor is contained.
[Claim 10] Said attribute information is image formation equipment according to claim 1 characterized by including the identification information of the predetermined material [ exhausting ] used for image formation.

[Claim 11] Said attribute information is image formation equipment according to claim 1 characterized by including the life information on the predetermined material [ exhausting ] used for image formation.
[Claim 12] Image formation equipment according to claim 1 characterized by providing the 2nd control means which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment.
[Claim 13] Said 2nd control means is image formation equipment according to claim 12 characterized by updating the attribute information which is based for every image formation sequence of said body of image formation equipment, and is memorized by said 1st nonvolatile memory.
[Claim 14] Said 2nd control means is image formation equipment according to claim 12 characterized by updating the attribute information which said body of image formation equipment is based for every image formation sequence activation of the count of predetermined, and is memorized by said 1st nonvolatile memory.
[Claim 15] Said 2nd control means is image formation equipment according to claim 12 characterized by said body of image formation equipment stopping renewal of the attribute information which judges the image sequence activation existence at the time of possible [ of operation ], and is memorized by said 1st nonvolatile memory based on this judgment result.
[Claim 16] The consumption material management method of the image-formation equipment which considered two or more units equipped with the 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] which is characterized by to provide the following, and which is used for image formation, and its busy condition, and the 1st nonvolatile memory of each unit as the configuration which detaches and attaches freely on the body of image-formation equipment The judgment process which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement The information process which reports the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious The 1st updating process which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged when it judges with said judgment means being inharmonious, and updates the attribute information on said 2nd non-volatile storage means The 2nd updating process which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates two or more different material [ exhausting ] exhausted for every image formation processing to the consumption material management method of exchangeable image formation equipment and image formation equipment.
[0002]

[Description of the Prior Art] Recent years come, printer equipment is colorized and it is increasingly used as a user's various expression means. Especially the color page printer equipment using an electrophotography method has attracted attention in respect of the silence, its quality image quality, and high-speed printing.
[0003] The full color laser beam printer equipment which is one of the color page printer equipment If the process imprinted on record media, such as the recording paper of imprint drum lifting, is made into the 1st process after scanning a laser beam to a main scanning direction and performing the 1st development using the 1st toner on a photo conductor It can come, and is alike, then the 2nd, 3rd, and 4th processes perform image formation of a multi-colored picture image, and record succeedingly using the 2nd - the 4th toner.
[0004] Generally each color toner of Y (yellow), M (Magenta), C (cyanogen), and K (black) performing image formation, carrying out the multiplex imprint of these at a record medium, and obtaining a color picture according to such four processes, is known for the color laser beam printer equipment of an electrophotography method.
[0005] Next, the record approach of the multi-colored picture image in such conventional full color printer equipment is explained with reference to drawing 18 and drawing 19 .
[0006] Drawing 18 is the sectional view showing the configuration of conventional full color printer equipment, and drawing 19 is a block diagram explaining the control configuration of the full color printer equipment shown in drawing 18 .
[0007] First, the photoconductor drum 1201 which rotates in the direction of an arrow head with constant speed as shown in drawing 18 is charged on a predetermined polarity and a predetermined electrical potential difference with the electrification vessel 1204. Subsequently, paper is fed at a time to one sheet of recording paper P from a sheet paper cassette 1215 to predetermined timing with the feed roller 1214. If the tip of the recording paper P is detected from a detector 1202, it becomes irregular with a picture signal VDO (8 bits of each color component of pixel each), and after laser beam L is injected towards the polygon mirror 1207 driven by the scanner motor 1206 and is reflected by the polygon mirror 1207 from semiconductor laser 1205, through a lens 1208 and a mirror 1209, it is led to a photoconductor drum 1201 and a photoconductor drum 1201 top is scanned.
[0008] On the other hand, the signal from a detector 1202 is outputted to the image formation section 1250 shown in drawing 19 as Vertical Synchronizing signal TOPSNS. Moreover, a detector's 1217 detection of laser beam L outputs the beam detecting signal (BD signal) used as a Horizontal Synchronizing signal to the image formation section 1250. And a picture signal VDO is sent out to semiconductor laser 1205 one by one synchronizing with BD signal.
[0009] The scanner motor 1206 is controlled by the motor control circuit 1225 to carry out the radix point of the signal S1 from the criteria oscillator 1220 with constant speed according to the signal S2 from the counting-down circuit which carries out dividing. And synchronizing with BD signal, scan exposure of the photoconductor drum 1201 is carried out, subsequently, the 1st electrostatic latent image is developed by development counter 1203Y with the toner of a yellow color, and the toner image of a yellow color is formed on a photoconductor drum 1201.
[0010] Electrostatic adsorption of the detail paper P is carried out on the front face of the imprint drum 1216 at the same time polar predetermined imprint bias voltage opposite to a toner is impressed to the imprint drum 1216 and the toner image of a yellow color is imprinted by the detail paper P, just before the tip of the detail paper P to which paper was fed to predetermined timing arrives at an imprint starting position on the other hand.
[0011] Next, the 2nd electrostatic latent image is formed of the scan of laser beam L on a

photoconductor drum 1201, and the 2nd electrostatic latent image is developed by development counter 1203M with the toner of a Magenta color. Alignment with the toner image of the yellow color by which the image tip was before imprinted with the TOPSNS signal is performed, and the toner image of the Magenta color formed on the photoconductor drum 1201 is imprinted by the recording paper P.

[0012] Similarly, the 3rd electrostatic latent image is developed and negatives are developed by development counter 1203C with the toner of a cyanogen color, and alignment with the image with which the toner image of a cyanogen color was imprinted before is performed, and the recording paper P imprints. Subsequently The 4th electrostatic latent image is developed, negatives are developed by development counter 1203K with a black toner, alignment with the image with which the black toner image was imprinted before is performed, and the recording paper P imprints.

[0013] Thus, the VDO signal for 1 page is outputted to semiconductor laser 1205 one by one for every process. Moreover, a non-imprinted toner image fails to be scratched with a cleaner 1210 for every imprint process.

[0014] Then, when the point of the recording paper P with which the toner image of four colors was imprinted approaches the location of the separation pawl 1212, the separation pawl 1212 approaches, and the tip of the recording paper P contacts the front face of the imprint drum 1216, and makes the recording paper P separate from the imprint drum 1216. The tip of the separation pawl 1212 continues contacting the imprint drum 1216 until the back end of the recording paper P separates from the imprint drum 1216, it is left after that, and returns to the original location. And the aerial discharge at the time of deleaving is decreased at the same time the stored charge on the recording paper P is discharged with the electric discharge vessel 1211 and it makes easy separation of the recording paper P by the separation pawl 1212.

[0015] It is fixed to the image developed at the end by the fixing roller 1213, and it is delivered to a paper output tray 1229. in addition, semiconductor laser 1205, the scanner motor 1206, the polygon mirror 1207, and detectors 1202 and 1217 are removed from each component of drawing 18 in the image formation section 1250 in drawing 19 -- it is the generic name of an element altogether.

[0016] Drawing 20 is a timing chart which shows the relation between the TOPSNS signal shown in drawing 19 , and a VDO signal.

[0017] For A1, in drawing 20 , printing actuation of the 1st toner color and A2 are [ printing actuation of the 3rd toner color and A4 of printing actuation of the 2nd toner color and A3 ] printing actuation of the 4th toner color. From the section A1 to A4 serves as color printing actuation which is 1 page.

[0018] Next, picture signal processing is explained.

[0019] Drawing 21 is the block diagram showing the functional configuration of conventional full color printer equipment 1302.

[0020] In drawing 21 , a host interface 1303 receives the print information 1307 from an external instrument 1301, for example, a host computer, and sends the picture signal 1309 included in reception print information in the control signal 1308 included in reception print information to the printer control section 1304 to the image-processing section 1305. And semiconductor laser 1306 is driven with the output signal of the image-processing section 1305. Moreover, the printer control section 1304 controls the image-processing section 1305 by the control signal 1310.

[0021] Drawing 22 is the block diagram showing the detail configuration of the image-processing section 1305 shown in drawing 21 .

[0022] The color processing section 1351 shown in drawing 22 receives a 124-bit RGB picture signal from the host interface 1303 shown in drawing 21 , and changes an input RGB code into the YMCK signal which carries out sequential correspondence to predetermined timing. That is, it changes into the 8-bit VDO signal with which an input RGB code is shown at M signal and a certain time at a Y signal and a certain time, and K signal is shown at C signal and a certain time at a certain time and which was mentioned above.
[0023] Drawing 23 is the timing chart of color signal transform processing which the color processing section 1351 shown in drawing 22 performs.
[0024] A1 and A2 in drawing 23 , A3, and A4 show the printing actuation to each same toner color as the printing actuation explained by drawing 20 . Furthermore, R1, G1, and B1 of drawing 23 show that the same RGB code is used to the printing actuation to each toner color. Moreover, a 2-bit color specification signal shows which color component each printing actuation is printing. "B" in each numeric value of the color specification signal of drawing 23 shows further again that the numeric value is a binary expression.
[0025] Now, as shown in drawing 22 , gamma amendment of the VDO signal of Y, M, C, and K from the color processing section 1351 is done in latter gamma amendment section 1352, and it is outputted as a 8-bit signal, and is inputted into the following Pulse-Density-Modulation section (the PWM section is called hereafter) 1353. In the PWM section 1353, a 8-bit picture signal is synchronized with the standup of an image clock (VCLK), and is latched by latch 1354. And the latched digital data is transformed to the analog voltage which corresponds by D/A converter 1355, and it inputs into an analog comparator 1356.
[0026] On the other hand, an image clock (VCLK) is inputted also into the triangular wave generating section 1358, is changed into a triangular wave and inputted into an analog comparator 1356 here. An analog comparator 1356 compares the triangular wave signal from the triangular wave generating section 1358 with the analog signal from D/A converter 1355, and outputs the signal by which Pulse Density Modulation was carried out. This signal by which pulse width modulation was carried out is reversed with an inverter 1357, and it is obtained as an PWM signal shows drawing 24 . In addition, drawing 24 is a timing diagram explaining the PWM signal generation process of the PWM section 1353 shown in drawing 22 .
[0027] Therefore, when the 8-bit image data inputted into the PWM section 1353 serves as maximum "FF (H)", an PWM signal with the widest width of face is outputted, and on the other hand, an PWM signal with the narrowest width of face is outputted in the time of becoming the minimum value "00 (H)."
[0028]
[Problem(s) to be Solved by the Invention] Although the function of the body of a printer has evolved as explained above, it cannot be said that the function and management method of an article of consumption are still enough.
[0029] First, although it was the life of an article of consumption, the life detection approach of a photoconductor drum cartridge measured the potential on the front face of a drum, and only rough life detection of it was completed, for example. Therefore, warning to a user could not but be the binary information of whether there are lives of enough by turning on a warning lamp in the display panel of the body of a printer, or there is nothing.
[0030] Next, the trouble of the case where the troublesome thing referred to as noticing after putting into the body of a printer and printing breaks out occurring **ed the article of consumption which became a life once since there was no idea of ID number of a proper in each of an article of consumption until now and each condition was not able to be identified, although

it is the management nature of an article of consumption again.
[0031] The purpose of the 1st invention which was made in order that this invention might cancel the above-mentioned trouble, and relates to this invention - the 16th invention By managing possible [ updating of attribute information such as a residue of each material / exhausting /, ], identifying each removable unit according to an individual based on the attribute information memorized to each unit to a body to image formation equipment While identifying each unit exhausted with activation of an image formation sequence according to an individual and being able to specify exchange existence to a user, it is offering the consumption material management method of the image formation equipment which manages the residue of the material [ exhausting ] etc. and can specify an exchange stage to a user, and image formation equipment.
[0032]
[Means for Solving the Problem] The 1st invention concerning this invention constitutes two or more units equipped with the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition free [ attachment and detachment ] on the body of image formation equipment.
[0033] The 2nd non-volatile storage means which the 2nd invention concerning this invention reads each attribute information memorized by the 1st nonvolatile memory of each unit, and is memorized, The judgment means which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement, When it judges with said judgment means being inharmonious, an information means to report the unit candidate by whom it was exchanged is established.
[0034] When it judges with said judgment means of the 3rd invention concerning this invention being inharmonious, the 1st control means which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged, and updates the attribute information on said 2nd non-volatile storage means is established.
[0035] The 4th invention concerning this invention displays the unit candidate by whom said information means was exchanged on a control panel.
[0036] Said information means notifies the unit candidate by whom it was exchanged to an external device, and gives an external indication of the 5th invention concerning this invention.
[0037] Said information means prints the unit candidate by whom it was exchanged to a record medium, and the 6th invention concerning this invention outputs it.
[0038] The 7th invention concerning this invention makes any one unit the development unit which develops the latent image formed in image support.
[0039] Any one unit makes 8th invention concerning this invention the development unit which develops the latent image formed in image support a color exception.
[0040] Any one unit makes 9th invention concerning this invention the photo conductor unit by which a photo conductor is contained.
[0041] The 10th invention concerning this invention contains the identification information of the predetermined material [ exhausting ] by which said attribute information is used for image formation.
[0042] The 11th invention concerning this invention includes the life information on predetermined material [ exhausting ] that said attribute information is used for image formation.
[0043] The 12th invention concerning this invention establishes the 2nd control means which updates the attribute information memorized by said 1st nonvolatile memory based on the image

formation sequence condition of the body of image formation equipment.
[0044] The 13th invention concerning this invention updates the attribute information which said 2nd control means is based for every image formation sequence of said body of image formation equipment, and is memorized by said 1st nonvolatile memory.
[0045] As for the 14th invention concerning this invention, as for said 2nd control means, said body of image formation equipment updates the attribute information which is based for every image formation sequence activation of the count of predetermined, and is memorized by said 1st nonvolatile memory.
[0046] Said 2nd control means judges the image [ body / of image formation equipment / said ] sequence activation existence at the time of possible [ of operation ], and the 15th invention concerning this invention stops renewal of the attribute information memorized by said 1st nonvolatile memory based on this judgment result.
[0047] The 1st nonvolatile memory which memorizes attribute information for the 16th invention concerning this invention to recognize the predetermined material [ exhausting ] used for image formation, and its busy condition, In the consumption material management method of the image formation equipment which considered two or more units equipped with the 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit as the configuration which can be freely detached and attached on the body of image formation equipment The judgment process which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement, The information process which reports the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious, The 1st updating process which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged when it judges with said judgment means being inharmonious, and updates the attribute information on said 2nd non-volatile storage means, It has the 2nd updating process which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment.
[0048]
[Embodiment of the Invention]
The [1st operation gestalt] With reference to an accompanying drawing, the suitable operation gestalt of this invention is hereafter explained to a detail.
[0049] Drawing 1 is a cross-section block diagram explaining the configuration of the image formation equipment in which the 1st operation gestalt of this invention is shown, for example, has the resolution of 600 dots per inch (dpi), and corresponds to the color laser beam printer (henceforth CLBP or a printer) which performs image recording based on the multiple-value data with which each pixel of color component each was expressed by 8 bits. In addition, also in other operation gestalten mentioned later, the body 1 of equipment is used as a common operation gestalt.
[0050] In the body 1 of equipment, the transfer paper P to which paper was fed from the feed section 101 is pinched by gripper 103f in the tip, and is held at the periphery of the imprint drum 103.
[0051] At this time, a detector 8 detects the tip of a transfer paper P, and a Vertical Synchronizing signal (after-mentioned) is generated by that detecting signal. The latent image formed in each color from the optical unit 107 is development-ized by each color development

counters Dy, Dc, Db, and Dm, two or more rotation copy is carried out to the form of an imprint drum periphery, and another color image is formed in the image support (henceforth a photoconductor drum) 100. Then, it dissociates from the imprint drum 103, is fixed to Form P in the fixing unit 104, and it is discharged by the paper output tray section 106 from a delivery unit 105.

[0052] The development counters Dy, Dc, Db, and Dm of each color have a rotation pivot to the both ends, and each is held pivotable centering on the shaft here at the development counter optional-feature section 108. By this, each development counters Dy, Dc, Db, and Dm can maintain the posture uniformly, even if the development counter optional-feature section 108 rotates centering on a revolving shaft 110 for development counter selection, as shown in drawing 1 . After the selected development counter's moving to a development location, the development counter optional-feature section 108 is pulled by solenoid 109a in the photoconductor drum 100 direction in the optional-feature maintenance frame 109 focusing on supporting-point 109b by the development counter and one, and moves in the photoconductor drum 100 direction.

[0053] Next, color picture formation actuation of the color laser beam printer of the above-mentioned configuration is explained concretely.

[0054] First, a photoconductor drum 100 is charged in a predetermined polarity with the electrification vessel 111 at homogeneity, on a photoconductor drum 100, the latent image of for example, M (Magenta) color is developed with the development counter Dm of M (Magenta) color by exposure by the laser beam light L, and the 1st toner image of M (Magenta) color is formed on a photoconductor drum 100 of it. While paper is fed to a transfer paper P to predetermined timing, the imprint bias voltage (+1.8kV) of a toner and antipole nature (for example, plus polarity) is impressed to the imprint drum 103 on the other hand and the 1st toner image is imprinted by the transfer paper P on a photoconductor drum 100, electrostatic adsorption of the transfer paper P is carried out on the front face of the imprint drum 103. Then, M (Magenta) color toner which remains with a cleaner 112 is removed, and latent-image formation and the development process of the following color are equipped with a photoconductor drum 100.

[0055] Next, the 2nd latent image of C (cyanogen) color is formed of the laser beam light L on a photoconductor drum 100, subsequently the 2nd latent image on the photo conductor drum 100 is developed by the development counter Dc of C (cyanogen) color, and the 2nd toner image of C (cyanogen) color is formed. And the 2nd toner image of C (cyanogen) color is imprinted by the transfer paper P according to the location of the 1st toner image of M (Magenta) color previously imprinted by the transfer paper P. In the imprint of the toner image of these two amorous glance, just before a transfer paper P reaches the imprint section, +2.1kV bias voltage is impressed to the imprint drum 103.

[0056] Similarly, sequential formation of the 3rd and 4th latent image of Y (yellow) color and Bk (black) color is carried out on a photoconductor drum 100, alignment of each is carried out to the toner image which sequential development was carried out with development counters Dy and Db, and was previously imprinted by the transfer paper P, and the sequential imprint of each 3rd [ of Y (yellow) color and Bk (black) color ] and 4th toner image is carried out. Thus, it will be formed after the toner image of four colors has lapped on a transfer paper P. In the imprint of the toner image of these 3 amorous glance and four amorous glance, just before a transfer paper P reaches the imprint section, bias voltage (+2.5kV and +3.0kV) is impressed to the imprint drum 103, respectively.

[0057] Thus, whenever it imprints the toner image of each color, imprint bias voltage is made high for preventing decline in imprint effectiveness. The main causes of a fall of this imprint effectiveness are to charge the front face of a transfer paper P in imprint bias voltage and reversed polarity by aerial discharge (for the imprint drum front face which is supporting the transfer paper to also be charged a little), accumulate this electrification charge for every imprint, and for imprint electric field fall for every imprint that imprint bias voltage is fixed, when a transfer paper P separates from a photoconductor drum 100 after an imprint.
[0058] the imprint bias and like-pole nature which were impressed on the occasion of the imprint of the four above-mentioned amorous glance when a transfer paper tip arrived at an imprint starting position, and were impressed to the effective alternating voltage of 5.5kV (a frequency is 500Hz) (including immediately after just before) at the time of the imprint of the 4th toner image -- and the direct-current bias voltage of +3.0kV of this potential is made to superimpose, and it is impressed by the electrification machine 111. Thus, when a transfer paper tip arrives at an imprint starting position on the occasion of the imprint of four amorous glance, it is for preventing imprint nonuniformity to operate the electrification machine 111.
[0059] Especially, since it is easy to be conspicuous as a difference in a color even if slight imprint nonuniformity occurs in the imprint of a full color image, it is needed to impress necessary bias voltage to the electrification machine 111, and to make discharge actuation perform, as mentioned above. Then, when the point of the transfer paper P with which the superposition imprint of the toner image of four colors was carried out approaches a separation location, the separation pawl 113 approaches, and that tip contacts the front face of the imprint drum 103, and makes a transfer paper P separate from the imprint drum 103. The tip of the separation pawl 113 maintains a contact condition with an imprint drum front face, separates from the retrodisplacement copy drum 103, and returns to the original location. While the electrification machine 111 operates until the transfer paper back end separates the imprint drum 103 from from, when the tip of a transfer paper arrives at the imprint starting position of the last color (the 4th amorous glance) as mentioned above, and it discharges the stored charge on a transfer paper (a toner and antipole nature) and making easy separation of the transfer paper P by the separation pawl 113, the aerial discharge at the time of separation is decreased. In addition, when the back end of a transfer paper P arrives at an imprint termination location (outlet of the nip section which a photoconductor drum 100 and the imprint drum 103 form), imprint bias voltage impressed to the imprint drum 103 is turned OFF (touch-down potential).
[0060] Bias voltage which could come, simultaneously was being impressed to the electrification machine 111 is turned OFF. Next, it is conveyed by the fixing assembly (unit) 104, it is fixed to the toner image on a transfer paper here, and the separated transfer paper P is discharged on a paper output tray 106.
[0061] Next, actuation of the image formation by laser beam scan is explained.
[0062] In drawing 1 , 107 is an optical unit and is constituted by a detector 9, semiconductor laser 120, the polygon mirror 121, the scanner motor 122, the lens 123, and the mirror 125. If paper is fed to a transfer paper P and the tip is conveyed by the imprint drum 103, synchronizing with it, a picture signal VDO will be outputted to semiconductor laser 120 at 1 page, light beam L modulated by the picture signal VDO will be injected towards the polygon mirror 121 rotated by the scanner motor 122, and the injected light beam L will be led to a photoconductor drum 100 by the lens 123 and the mirror 125.
[0063] Moreover, if light beam L is injected, light beam L will be detected by the detector 9 arranged on a horizontal-scanning shaft, and BD (beam detection) signal used as a Horizontal

Synchronizing signal is outputted. Consequently, synchronizing with BD signal, scan exposure of the photoconductor drum 100 is carried out by light beam L, and an electrostatic latent image is formed.
[0064] The color laser beam printer of this operation gestalt performs an image output in the resolution of 600 dots per inch (dpi) through the above image formation processes.
[0065] As input data of this equipment, the color picture data (for example, data expressed of a RGB component) generated with a host computer (henceforth a host), the image data which generated with other image data generation equipments (still image recorder etc.), and was stored in some storages can be considered. For this reason, as shown in this equipment at drawing 1 , the signal-processing section 4 which processes the printer controller 2 which receives the image information from a host and generates image data, and its image data is formed.
[0066] With some operation gestalten shown below, the color picture data sent by the host are considered as input data.
[0067] Drawing 2 is the block diagram showing the functional configuration of the printer 1 shown in drawing 1 .
[0068] In drawing 2 , a printer 1 receives the image information of the predetermined description language sent from host computers (henceforth a host) 1000 and 1001 through a network 5, develops, and consists of the printer controllers 2 and printer engine 3 which output this as a YMCBk picture signal 6 with which each color component consists of 8 bits (D0-D7). Or since hosts 1000 and 1001 send out bit data, such as RGB read by the image reader etc., as image information 5, they process a printer controller 2 in this case, without interpreting this.
[0069] Between a printer controller 2 and printer engine 3, various picture signals are delivered and received in the form of serial communication 15 besides picture signal 6. There are a page (direction of vertical scanning) synchronizing signal (PSYNC) sent out to a printer controller 2 from printer engine 3, a synchronizing signal (LSYNC) of a main scanning direction, a 1-bit attribute assignment signal (PHIMG) sent out to printer engine 3 from a printer controller 2, and a clock (VCLK) for data transfer in these picture signals.
[0070] Here, an attribute assignment signal (PHIMG) is a signal which specifies the Rhine consistency of the image outputted from a printer, and 600dpi is shown for 300dpi at the time of PHIMG= "L" at the time of PHIMG="H".
[0071] A printer controller 2 outputs the 8-bit signal of each color component for a picture signal 6 with a 1-bit attribute assignment signal (PHIMG) synchronizing with the clock (VCLK) for data transfer. 208 is a display and displays various information, such as a busy condition of the material [ exhausting ] which receives from the print controller 2. Moreover, a display 208 consists of touch panels and a user may enable it to input various setup to a printer 1.
[0072] Drawing 3 is the block diagram showing the functional configuration of the printer engine 3 shown in drawing 2 .
[0073] In drawing 3 , uniform rotation of the scanner motor 122 is carried out by the motor control circuit 12 (the well-known phase control circuit which is not illustrated is built in) so that dividing of the reference clock from the criteria oscillator 10 contained in the optical unit 107 may be carried out by the counting-down circuit 11 and phase contrast of a dividing clock and the feedback signal from the scanner motor 122 may be made into predetermined phase contrast. And rotation of the scanner motor 122 is transmitted to the polygon mirror 121, and uniform rotation of the polygon mirror 121 is carried out.
[0074] On the other hand, uniform rotation of the imprint drum 103 is carried out by the drive motor (un-illustrating), the tip of the recording paper P on the imprint drum 103 is detected by

the detector 8, and a Vertical Synchronizing signal (VSYNC) is outputted to the signal-processing section 4. And the image tip of each color is prescribed by the Vertical Synchronizing signal (VSYNC). After a Vertical Synchronizing signal (VSYNC) is outputted, synchronizing with BD signal, a picture signal (VDO) is sent out to semiconductor laser 120 one by one by making into a Horizontal Synchronizing signal (HSYNC) BD signal generated by the detector 9.
[0075] Moreover, CPU14 which the signal-processing section 4 builds in performs a printer controller 2 and serial communication, exchanges control signals, and synchronizes actuation of a printer controller 2 and printer engine 3. Moreover, CPU14 is communicating the backup memory 230 with the development counter memory 203-206 and the sensitization drum memory 207 through serial communication Rhine 202. Said development counter memory 203-206 is EEPROM attached in the development counter of each color, and the sensitization drum memory 207 is EEPROM attached in the photoconductor drum cartridge.
[0076] The timing of the above-mentioned Vertical Synchronizing signal (VSYNC) in an image formation process, a Horizontal Synchronizing signal (BD), and a picture signal (VDO) comes to be shown in drawing 4 . In addition, drawing 4 is drawing 2 and a timing chart explaining actuation of drawing 3 .
[0077] Hereafter, correspondence and its operation with this operation gestalt and each means of the 1st - the 15th invention are explained with reference to drawing 3 etc.
[0078] Since the 1st invention constituted two or more units equipped with the 1st nonvolatile memory (the development counter memory 203-206, the sensitization drum memory 207 which consist of these operation gestalten, for example by EEPROM) which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition free [ attachment and detachment ] on the body of image formation equipment, it can identify each unit and can recognize a busy condition.
[0079] The 2nd invention is the 1st nonvolatile memory (with this operation gestalt) which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition. For example, two or more units equipped with the development counter memory 203-206 which consists of EEPROMs, and the sensitization drum memory 207 are constituted free [ attachment and detachment ] on the body of image formation equipment. And the 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit (backup memory 230), Each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit is read. The judgment means (the control program memorized by ROM or other memory resources which CPU14 does not illustrate is performed, and judgment processing is carried out) which carries out the collating judging of whether to be in agreement, When it judges with said judgment means being inharmonious, it has an information means (the control program memorized by ROM or other memory resources which CPU14 does not illustrate is performed, and information processing is carried out) to report the unit candidate by whom it was exchanged. When each attribute information memorized by each attribute information that CPU14 is memorized by the backup memory 230, the development counter memory 203-206, and the sensitization drum memory 207 is read and it judges with it being inharmonious Since the unit candidate by whom it was exchanged is reported, the exchange existence of each unit can be recognized certainly and it can show clearly to a user.
[0080] Since the 3rd invention reads the attribute information memorized by the development counter memory 203-206 for which it was exchanged, or the sensitization drum memory 207 and

updates the attribute information on a backup memory 230 when it judges with CPU14 being inharmonious, after exchange of each unit, it can continue, and it can identify each unit, and can manage a busy condition.
[0081] Since the unit candidate by whom it was exchanged is displayed on a control panel (display 208 shown in drawing 2 ), CPU14 identifies the unit exchanged by the user who works by the body side of an image processing system, and the 4th invention can specify it.
[0082] Since CPU14 notifies the unit candidate by whom it was exchanged to an external device (host computer 1000) and indicates by external (monitor 1000A), from the body of an image processing system, the 5th invention identifies the unit exchanged by the user who works by the exterior side which carried out remoteness, and can specify it.
[0083] Since CPU14 prints the unit candidate by whom it was exchanged to a record medium and the 6th invention outputs, a user can do the follow up of the exchange hysteresis of each unit.
[0084] Since the 7th invention considers as the development unit which develops the latent image formed in image support, any one unit can recognize the exchange existence of a development unit certainly, and it can specify it to a user.
[0085] Since any one unit makes 8th invention the development unit which develops the latent image formed in image support a color exception, it can recognize certainly the exchange existence of the development unit according to each color, and it can specify it to a user.
[0086] Since the 9th invention considers as the photo conductor unit by which a photo conductor is contained, any one unit can recognize the exchange existence of a photo conductor unit certainly, and it can specify it to a user.
[0087] Since said attribute information contains the identification information of the predetermined material [ exhausting ] used for image formation, the 10th invention can identify the material [ exhausting ] of each unit, and can recognize each busy condition.
[0088] Since said attribute information includes the life information on the predetermined material [ exhausting ] used for image formation, the 11th invention can notify the exchange stage of the material [ exhausting ] of each unit to timely to a user.
[0089] Since the 12th invention updates the attribute information CPU14 is remembered to be by the backup memory 230 based on the image formation sequence condition of the body of image formation equipment, it can manage the consumption material residue consumed out of each unit according to a busy condition, and can specify an exchange stage.
[0090] Since CPU14 updates the attribute information which is based for every image formation sequence of said body of image formation equipment, and is memorized by the development counter memory 203-206 and the sensitization drum memory 207, the 13th invention can manage the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence on real time.
[0091] Since CPU14 updates the attribute information which said body of image formation equipment is based for every image formation sequence activation of the count of predetermined, and is memorized by the development counter memory 203-206 and the sensitization drum memory 207, even if the 14th invention is a storage which has a limit in the count of memory access, it can manage certainly the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation of the count of predetermined within a memory life.
[0092] In the 15th invention, CPU14 judges the image [ body / of image formation equipment / said ] sequence activation existence at the time of possible [ of operation ]. Since renewal of the attribute information memorized by the development counter memory 203-206 and the

sensitization drum memory 207 based on this judgment result is stopped Since unnecessary memory access is restricted when the image formation sequence of the count of predetermined is not performed even if it is the storage which has a limit in the count of memory access, the newest consumption material residue consumed out of each unit is certainly manageable within a memory life.

[0093] Drawing 5 is the block diagram showing the configuration of the signal-processing section 4 shown in drawing 3 , and the signal-processing section 4 in this operation gestalt is divided roughly into the Rhine memory 20 and the halftone processing section by PWM.

[0094] The Rhine memory 20 carries out actuation read with the image clock (PCLK) of printer engine 3, after storing the multiple-value image data (D0-D7) and attribute assignment signal (PHIMG) which are sent out from a printer controller 2 with the clock (VCLK) for data transfer.

[0095] Moreover, it consists of the halftone processing section by PWM, gamma amendment section 21, the D/A transducer 22, comparators 23 and 24, the triangular wave generating sections 26 and 27, and a selector 28. And gamma amendment of the multiple-value image data from the Rhine memory 20 is done in gamma amendment section 21, and after being changed into an analog signal by the D/A transducer 22, it is inputted into the plus input terminal (+) of comparators 23 and 24. On the other hand, the output signal of the triangular wave generating sections 26 and 27 which generate a triangular wave signal based on the clock of 1/2PCLK which carried out dividing of it to the image clock (PCLK) is inputted into the negative input terminal (-) of comparators 23 and 24.

[0096] And each comparators 23 and 24 compare these 2 signal, and generate the signal of pulse width according to a multiple-value picture signal. An PWM signal for resolution to form [ an PWM signal for resolution to form the image of 600dpi from a comparator 23 ] the image of 300dpi from a comparator 24 on the other hand is outputted. The output signal of these two comparators 23 and 24 is inputted into a selector 28.

[0097] According to the attribute assignment signal (PHIMG) inputted, at the time of PHIMG="H", a selector 28 chooses the PWM signal (it is used for the image formation of resolution 300dpi) from a comparator 24, on the other hand, chooses the PWM signal (it is used for the image formation of resolution 600dpi) from a comparator 23, and sends it out to the laser mechanical component 120 as a picture signal (VDO) at the time of PHIMG= "L."

[0098] Drawing 6 is a timing chart explaining the signal-processing timing of the signal-processing section 4 shown in drawing 3 , and corresponds to the timing chart of the various control signals relevant to the PWM signal generation process in the case of having no screen angle.

[0099] Hereafter, the configuration of serial communication Rhine 202 between each memory 203-207 shown in drawing 3 with reference to drawing 7 - drawing 9 and CPU14 is explained.

[0100] Drawing 7 is a block diagram explaining the configuration of the interface circuitry in the signal-processing section 4 shown in drawing 3 .

[0101] In drawing, 211,212,213 is a digital transistor. 210 is an PNP mold power transistor, and when "LOW" is outputted from the port PO of CPU14, it supplies a power source to VCC Rhine of the signal group 202. CPU14 will open wide VCC currently supplied to each memory by setting Port PO to "High", if it detects that the user opened the door which a printer 1 does not illustrate, and it turns off power. The clock signal for [ CS / which are supplied to the Magenta development counter memory 203 which consists of EEPROMs which show VCC of the signal group 202 to drawing 8 / the power source and CS ] serial communication in a chip select signal and SCK, and DI express the input data to EEPROM, and DO expresses the output signal from

EEPROM.
[0102] VCC, SCK, DI, DO, and GND serve as each memory common bus among the above signals, CS considers as the signal line (from the port P1 of CPU14 - a port P5 to an output) which became independent in each memory 203-207, respectively, and CS signal of the backup memory 230 in the signal-processing section 4 is outputted from the port P6 of CPU14.
[0103] Drawing 8 is a block diagram explaining the example of a circumference circuit of the Magenta development counter memory 203 shown in drawing 3 , and has given the same sign to the same thing as drawing 7 . In addition, the circuit concerned consists of electric substrates, and as shown in drawing 9 , it is included in the development cartridge (development counter).
[0104] As for a digital transistor and 217-219,221-223, in drawing 8 , resistance, and 224-226 is [ 220 ] capacitors.
[0105] This circuitry is communalized to both cyanogen development counter memory yellow development counter memory black development counter memory and a sensitization drum memory.
[0106] Drawing 9 is a top view explaining the configuration of the Magenta development counter with which the printer 1 shown in drawing 1 can be equipped.
[0107] For 227, as for a memory circuit substrate and 203, in drawing, the body of a development counter and 228 are [ EEPROM and 229 ] connectors. The signal of CPU14 and EEPROM203 in the signal-processing section 4 is connected by the connector 229.
[0108] Drawing 10 is drawing showing the timing chart for explaining data reading / data write-in timing to EEPROM203 of the development counter 227 shown in drawing 9 .
[0109] I/O of the data to this EEPROM203 is performed by serial communication. The DS of the serial communication consists of a start "1" bit, an operation code "2" bit showing the contents of the instruction, the address, and data.
[0110] If this drawing (a) shows the time of reading and sends out a start, an operation code, and the address from the Maine control CPU 14 first synchronizing with Clock SCK, data will be outputted from the serial data output terminal DO synchronizing with Clock SCK. This drawing (b) shows the time of writing, and the start sent out from the Maine control CPU 14 synchronizing with Clock SCK, an operation code, the address, and data are written in from the serial data input terminal DI.
[0111] Next, the contents stored in each memory (the above-mentioned memory 203-206,207) are explained.
[0112] Color information (a Magenta, cyanogen, yellow, or black is specified), the count of reuse, a manufacture manufacture name, ID number (proper number of the development counter), and the remnant service life to expect are stored in each development counter memory 203-206. Among these, color information, a manufacture manufacture name, and ID number are information stored at the time of manufacture. In the case of the development counter in which a toner stuffing substitute is possible, the count of reuse is repacked and updates a memory content at works. Moreover, the remnant service life to expect is information which expects from the print number of sheets which used the development counter, and is updated for every print.
[0113] On the other hand, a manufacture manufacture name, a manufacture date, ID number (proper number of the photoconductor drum), and the remnant service life to expect are stored in the sensitization drum memory 207. Among these, a manufacture manufacture name, a manufacture date, and ID number are information in which it is stored at the time of manufacture. Moreover, the remnant service life to expect is information which expects from the print number of sheets which used the development counter, and is updated for every print.

[0114] Drawing 11 is drawing showing the memory map of the development counter memory 203-206 according to each color shown in drawing 3 , and drawing 12 is drawing showing the memory map of the sensitization drum memory 207 shown in drawing 3 .
[0115] Drawing 13 is a flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 1st operation gestalt of this invention is shown. In addition, (1) - (7) shows each step, corresponds to the processing which paid its attention to the memory access of the period from powering on of this printer to a power source OFF, and performs and processes the control program memorized by ROM or other memory resources which CPU14 does not specifically illustrate.
[0116] First, if the power source of a printer 1 is turned on, while judging whether the contents of the backup memory 230 and the contents of each development counter memory 203-206 which have memorized the former condition are compared first, and it is in agreement When it judges whether the contents of the backup memory 230 are compared with the contents of the sensitization drum memory 207, and it is in agreement and it is judged that (1) and the result compared, respectively were in agreement, it judges that the development counter and photoconductor drum according to each color are the same as that of a former thing, and progresses to a step (4).
[0117] On the other hand, when it is judged at a step (1) that it is inharmonious It judges in which article of consumption (the development counter according to each color, photoconductor drum) it was exchanged from conflicting contents by collating with the information on each memory (EEPROM) which can be read, and a backup memory 230. While updating the contents of the backup memory 230, it displays on the display 208 shown [ (2) and coincidence ] to the user at information, for example, drawing 2 , or host computer 1000 grade, and it is certain (3) which carries out ** print-out and is reported.
[0118] The contents compared concretely are the manufacture manufacture name shown in drawing 11 , ID number, and the manufacture manufacture name shown in drawing 12 and ID number. In addition, the approach of information is described later.
[0119] Next, whenever it supervises that the print was performed and a print is performed, the contents of (4), each development counter memory 203-206, and the sensitization drum memory 207 are updated (5). As concrete contents of updating, for example the print life number of sheets of the development counter according to each color, and a photoconductor drum It writes in each development counter memory 203-206 and the sensitization drum memory 207 at the time of manufacture. It always supervises through the door sensor which carries out the down count whenever it prints one sheet, and does not illustrate that the front door (not shown) was opened, and if it detects having been opened, the same processing as return will be repeated to (6) and a step (1).
[0120] And if return and the same processing are repeated to (7) and a step (4) and the power source of a printer 1 is turned off until the power source of a printer 1 is turned off, a series of sequences will be ended.
[0121] Next, the approach of information is explained. It roughly divides and there is three following approach (A) - (C).
[0122] (A) Display information on a printer controller 2 through a network 5 with the monitor of the host computers 1000 and 1001 which are user terminals through serial communication 15 from delivery and there.
[0123] (B) Through serial communication 15, indicate information at a printer controller 2 and indicate the information by delivery from delivery and there at the display panel 208 of a printer

1.
[0124] (C) Print and print out this information. Or this information is printed out on a power-on page.
[0125] Drawing 14 - drawing 16 are drawings showing the example of a consumption material management report notification in the image formation equipment concerning this invention. Drawing 14 It corresponds to the information approach of the above (A), and corresponds to the example displayed on monitor 1000A of a computer 1000 as a management report REPORT1. Drawing 15 It corresponds to the information approach of the above (B), and corresponds to the example displayed on the display 208 shown in drawing 2 as a management report REPORT2, and drawing 16 corresponds to the information approach of (C), and shows the example printed out as a management report REPORT3 from printer engine 3.
[0126] As shown in drawing 14 , when this is using the common printer at two or more terminals by reporting to a user terminal, it becomes possible to get to know the condition of the article of consumption of a printer also at the terminal of a printer and the physically distant location. In addition, not only when an article of consumption is changed, but when a user wants to know this information, you may make it see article-of-consumption information at a terminal.
[0127] Moreover, if it displays on the display panel 208 of a printer as shown in drawing 15 , it is the spot which exchanged articles of consumption, and the exchange person can check the article-of-consumption condition. For example, when it exchanges for a used development counter, the residual life time can recognize by the display panel 208.
[0128] Furthermore, if information is printed out as shown in drawing 16 , it will remain as hysteresis.
[0129] In addition, although this operation gestalt explained the case where memory 203-207 was constituted from an EEPROM, other nonvolatile memory is sufficient. For example, when requiring only read-only information, such as color information shown in drawing 11 , a manufacture manufacture name, and ID number, ultraviolet-rays elimination type ROM is sufficient.
[0130] Moreover, CPU and EEPROM may put EEPROM built-in [ which was one-chip-ized / CPU ] on an article of consumption. In this case, the communication link with CPU14 of the signal-processing section 4 can simplify more.
[0131] Furthermore, the approach of forming a sensor in the body side of a printer, and attaching an information supporter called a magnetic tape bar code in an article-of-consumption side may be used.
[0132] Moreover, about the calculation approach of residual life time, in addition to the count of mere print number of sheets, more exact detection may be performed combining a conventional photo sensor and a conventional potential sensor, and the result may be added to the memory of an article of consumption.
[0133] The [2nd operation gestalt] Drawing 17 is a flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 2nd operation gestalt of this invention is shown. In addition, (1) - (9) shows each step and corresponds to the processing which paid its attention to the memory access of the period of the power up of a printer 1 to the time of OFF.
[0134] First, the register is incremented, whenever it will reset the register which counts the print number of sheets in CPU14 of (1) and the signal-processing section 4 and will perform print actuation, if the power source of a printer 1 is turned on (2). And it judges whether said register value showed ten sheets, and if it becomes YES, CPU14 will read the residual life time of each

development counter memory 203-206 and the sensitization drum memory 207, will rewrite the contents of memory 203-207 to (4) and the value which carried out the decrement only of "10" from the value, and will return to (3) and a step (1).
[0135] On the other hand, when it is judged that the register value does not show ten sheets at a step (4) Next, CPU14 supervises the residual life time of each development counter memory 203-206 and the sensitization drum memory 207. It judges whether it became predetermined residual life time, for example, "100" **, "50" **, "10" **, and "0" **, and in (5) and Yes, it reports to a user, and it returns to processing of (6) and a step (1). In addition, suppose that it is the same as that of the 1st operation gestalt about the information approach to a user.
[0136] On the other hand, in No, it progresses to a step (7) at a step (5). subsequently, a ******** [ that the power source of a printer 1 was turned off ] -- judging -- (7) -- if it becomes NO, return and the same sequence will be repeated to a step (1).
[0137] On the other hand, when it judges whether the value of the print number-of-sheets register of CPU14 is "0" when it is judged that the power source was turned off and (8) and YES, i.e., one sheet, do not print at a step (7), processing is ended as it is.
[0138] On the other hand, when it is judged at a step (8) that the print number-of-sheets register of CPU14 is more than "1", after rewriting the contents of residual life time of each development counter memory 203-206 and the sensitization drum memory 207 by the number of sheets, (9) and this sequence are ended.
[0139] Hereafter, correspondence and its operation with this operation gestalt and each process of the 16th invention are explained with reference to drawing 13 , drawing 17 , etc.
[0140] The 1st nonvolatile memory which memorizes attribute information for the 16th invention to recognize the predetermined material [ exhausting ] used for image formation, and its busy condition (the development counter memory 203-206, sensitization drum memory 207), In the consumption material management method of the image formation equipment which considered two or more units equipped with the 2nd non-volatile storage means (backup memory 230) which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit as the configuration which can be freely detached and attached on the body of image formation equipment The judgment process which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement (step of drawing 13 (1)), The information process which reports the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious (step of drawing 13 (3)), The 1st updating process which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged when it judges with said judgment means being inharmonious, and updates the attribute information on said 2nd non-volatile storage means (step of drawing 13 (2)), the 2nd updating process (the step (5) of drawing 13 --) which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment The control program memorized by ROM or other memory resources which CPU14 which showed step [ of drawing 17 ] (1) - (9) to drawing 3 does not illustrate is performed. The newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation is manageable.
[0141] In a full color print (i.e., when the development counter of all colors is used), the above explanation is the thing of an about. For example, in the case of the printing mode of black monochrome, only the contents of the black development counter memory 206 and the

sensitization drum memory 207 should be updated.
[0142] As explained above, with this operation gestalt, the following two effectiveness can be considered by reducing the count of rewriting of each development counter memory 203-206 or the sensitization drum memory 207. The 1st is fully being able to have a margin to the life of the own count of rewriting of a memory device. For example, the count of writing of EEPROM is 100,000 or less times. On the other hand, the number of photoconductor drum lives is about 20,000. According to this operation gestalt, rewriting of the sensitization drum memory 207 becomes 2000 times, will be used by 1/50 of the lives of EEPROM, and can have sufficient margin.
[0143] I hear that the 2nd can fully lower the probability which destroys a memory content, and there are. Breakage of a memory content is mainly generated during write-in actuation. Although this probability is very low, reliance can be further raised by reducing this count of writing.
[0144] In addition, even if it applies this invention to the system which consists of two or more devices, it may be applied to the equipment which consists of one device. Moreover, it cannot be overemphasized that this invention can be applied also when attained by supplying a program to a system or equipment. In this case, that system or equipment becomes possible [ enjoying the effectiveness of this invention ] by reading the storage which stored the program expressed by the software for attaining this invention to this system or equipment.
[0145] Furthermore, the system or equipment becomes possible [ enjoying the effectiveness of this invention ] by downloading the program expressed by the software for attaining this invention by the communications program, and reading it from the database on a network.
[0146]
[Effect of the Invention] Since two or more units equipped with the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation and its busy condition were constituted free [ attachment and detachment ] on the body of image formation equipment according to the 1st invention concerning this invention as explained above, each unit can be identified and a busy condition can be recognized.
[0147] Since an information means reports the unit candidate by whom it was exchanged when according to the 2nd invention each attribute information memorized by the 1st nonvolatile memory of each attribute information that a judgment means is memorized by said 2nd non-volatile storage means, and each unit is read and it judges with it being inharmonious, the exchange existence of each unit can be recognized certainly and it can show clearly to a user.
[0148] Since according to the 3rd invention the 1st control means reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged and updates the attribute information on said 2nd non-volatile storage means when it judges with said judgment means being inharmonious, after exchange of each unit, it can continue, each unit can be identified, and a busy condition can be managed.
[0149] According to the 4th invention, since the unit candidate by whom it was exchanged is displayed on a control panel, said information means can identify and specify the unit exchanged by the user who works by the body side of an image processing system.
[0150] According to the 5th invention, since the unit candidate by whom it was exchanged is notified to an external device and it indicates by external, said information means can identify and specify the unit exchanged by the user who works by the exterior side which carried out remoteness from the body of an image processing system.
[0151] According to the 6th invention, since said information means prints and outputs the unit

candidate by whom it was exchanged to a record medium, a user can do the follow up of the exchange hysteresis of each unit.

[0152] According to the 7th invention, since it considers as the development unit which develops the latent image formed in image support, any one unit can recognize the exchange existence of a development unit certainly, and can specify it to a user.

[0153] According to the 8th invention, since it considers as the development unit which develops the latent image formed in image support a color exception, any one unit can recognize certainly the exchange existence of the development unit according to each color, and can specify it to a user.

[0154] According to the 9th invention, since it considers as the photo conductor unit by which a photo conductor is contained, any one unit can recognize the exchange existence of a photo conductor unit certainly, and can specify it to a user.

[0155] According to the 10th invention, since the identification information of the predetermined material [ exhausting ] used for image formation is included, said attribute information can identify the material [ exhausting ] of each unit, and can recognize each busy condition.

[0156] According to the 11th invention, since said attribute information includes the life information on the predetermined material [ exhausting ] used for image formation, it can notify the exchange stage of the material [ exhausting ] of each unit to timely to a user.

[0157] Since the attribute information the 2nd control means is remembered to be by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment is updated according to the 12th invention, the consumption material residue consumed out of each unit according to a busy condition can be managed, and an exchange stage can be specified.

[0158] According to the 13th invention, since the attribute information which is based for every image formation sequence of said body of image formation equipment, and is memorized by said 1st nonvolatile memory is updated, said 2nd control means can manage the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence on real time.

[0159] According to the 14th invention, since the attribute information which said body of image formation equipment is based for every image formation sequence activation of the count of predetermined, and is memorized by said 1st nonvolatile memory is updated, said 2nd control means can manage certainly the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation of the count of predetermined within a memory life, even if it is the storage which has a limit in the count of memory access.

[0160] According to the 15th invention, said 2nd control means Since said body of image formation equipment stops renewal of the attribute information which judges the image sequence activation existence at the time of possible [ of operation ], and is memorized by said 1st nonvolatile memory based on this judgment result Since unnecessary memory access is restricted when image formation sequence activation of the count of predetermined is not carried out even if it is the storage which has a limit in the count of memory access, the newest consumption material residue consumed out of each unit is certainly manageable within a memory life.

[0161] The collating judging of whether according to the 16th invention, to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement is carried out. When it judges with it being inharmonious, while reporting the unit candidate by whom it was

exchanged Read the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged, and the attribute information on said 2nd non-volatile storage means is updated. Furthermore, since the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment is updated While being able to identify each unit and being able to recognize a busy condition, the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation is manageable.
[0162] Therefore, while identifying each unit exhausted with activation of an image formation sequence according to an individual and being able to specify exchange existence to a user, the residue of the material [ exhausting ] etc. is managed and the effectiveness of being able to specify an exchange stage to a user is done so.

## TECHNICAL FIELD

[Field of the Invention] This invention relates two or more different material [ exhausting ] exhausted for every image formation processing to the consumption material management method of exchangeable image formation equipment and image formation equipment.

## PRIOR ART

[Description of the Prior Art] Recent years come, printer equipment is colorized and it is increasingly used as a user's various expression means. Especially the color page printer equipment using an electrophotography method has attracted attention in respect of the silence, its quality image quality, and high-speed printing.
[0003] The full color laser beam printer equipment which is one of the color page printer equipment If the process imprinted on record media, such as the recording paper of imprint drum lifting, is made into the 1st process after scanning a laser beam to a main scanning direction and performing the 1st development using the 1st toner on a photo conductor It can come, and is alike, then the 2nd, 3rd, and 4th processes perform image formation of a multi-colored picture image, and record succeedingly using the 2nd - the 4th toner.
[0004] Generally each color toner of Y (yellow), M (Magenta), C (cyanogen), and K (black) performing image formation, carrying out the multiplex imprint of these at a record medium, and obtaining a color picture according to such four processes, is known for the color laser beam printer equipment of an electrophotography method.
[0005] Next, the record approach of the multi-colored picture image in such conventional full color printer equipment is explained with reference to drawing 18 and drawing 19 .
[0006] Drawing 18 is the sectional view showing the configuration of conventional full color printer equipment, and drawing 19 is a block diagram explaining the control configuration of the full color printer equipment shown in drawing 18 .
[0007] First, the photoconductor drum 1201 which rotates in the direction of an arrow head with constant speed as shown in drawing 18 is charged on a predetermined polarity and a predetermined electrical potential difference with the electrification vessel 1204. Subsequently, paper is fed at a time to one sheet of recording paper P from a sheet paper cassette 1215 to

predetermined timing with the feed roller 1214. If the tip of the recording paper P is detected from a detector 1202, it becomes irregular with a picture signal VDO (8 bits of each color component of pixel each), and after laser beam L is injected towards the polygon mirror 1207 driven by the scanner motor 1206 and is reflected by the polygon mirror 1207 from semiconductor laser 1205, through a lens 1208 and a mirror 1209, it is led to a photoconductor drum 1201 and a photoconductor drum 1201 top is scanned.

[0008] On the other hand, the signal from a detector 1202 is outputted to the image formation section 1250 shown in drawing 19 as Vertical Synchronizing signal TOPSNS. Moreover, a detector's 1217 detection of laser beam L outputs the beam detecting signal (BD signal) used as a Horizontal Synchronizing signal to the image formation section 1250. And a picture signal VDO is sent out to semiconductor laser 1205 one by one synchronizing with BD signal.

[0009] The scanner motor 1206 is controlled by the motor control circuit 1225 to carry out the radix point of the signal S1 from the criteria oscillator 1220 with constant speed according to the signal S2 from the counting-down circuit which carries out dividing. And synchronizing with BD signal, scan exposure of the photoconductor drum 1201 is carried out, subsequently, the 1st electrostatic latent image is developed by development counter 1203Y with the toner of a yellow color, and the toner image of a yellow color is formed on a photoconductor drum 1201.

[0010] Electrostatic adsorption of the detail paper P is carried out on the front face of the imprint drum 1216 at the same time polar predetermined imprint bias voltage opposite to a toner is impressed to the imprint drum 1216 and the toner image of a yellow color is imprinted by the detail paper P, just before the tip of the detail paper P to which paper was fed to predetermined timing arrives at an imprint starting position on the other hand.

[0011] Next, the 2nd electrostatic latent image is formed of the scan of laser beam L on a photoconductor drum 1201, and the 2nd electrostatic latent image is developed by development counter 1203M with the toner of a Magenta color. Alignment with the toner image of the yellow color by which the image tip was before imprinted with the TOPSNS signal is performed, and the toner image of the Magenta color formed on the photoconductor drum 1201 is imprinted by the recording paper P.

[0012] Similarly, the 3rd electrostatic latent image is developed and negatives are developed by development counter 1203C with the toner of a cyanogen color, and alignment with the image with which the toner image of a cyanogen color was imprinted before is performed, and the recording paper P imprints. Subsequently The 4th electrostatic latent image is developed, negatives are developed by development counter 1203K with a black toner, alignment with the image with which the black toner image was imprinted before is performed, and the recording paper P imprints.

[0013] Thus, the VDO signal for 1 page is outputted to semiconductor laser 1205 one by one for every process. Moreover, a non-imprinted toner image fails to be scratched with a cleaner 1210 for every imprint process.

[0014] Then, when the point of the recording paper P with which the toner image of four colors was imprinted approaches the location of the separation pawl 1212, the separation pawl 1212 approaches, and the tip of the recording paper P contacts the front face of the imprint drum 1216, and makes the recording paper P separate from the imprint drum 1216. The tip of the separation pawl 1212 continues contacting the imprint drum 1216 until the back end of the recording paper P separates from the imprint drum 1216, it is left after that, and returns to the original location. And the aerial discharge at the time of deleaving is decreased at the same time the stored charge on the recording paper P is discharged with the electric discharge vessel 1211 and it makes easy

separation of the recording paper P by the separation pawl 1212.
[0015] It is fixed to the image developed at the end by the fixing roller 1213, and it is delivered to a paper output tray 1229. in addition, semiconductor laser 1205, the scanner motor 1206, the polygon mirror 1207, and detectors 1202 and 1217 are removed from each component of drawing 18 in the image formation section 1250 in drawing 19 -- it is the generic name of an element altogether.
[0016] Drawing 20 is a timing chart which shows the relation between the TOPSNS signal shown in drawing 19 , and a VDO signal.
[0017] For A1, in drawing 20 , printing actuation of the 1st toner color and A2 are [ printing actuation of the 3rd toner color and A4 of printing actuation of the 2nd toner color and A3 ] printing actuation of the 4th toner color. From the section A1 to A4 serves as color printing actuation which is 1 page.
[0018] Next, picture signal processing is explained.
[0019] Drawing 21 is the block diagram showing the functional configuration of conventional full color printer equipment 1302.
[0020] In drawing 21 , a host interface 1303 receives the print information 1307 from an external instrument 1301, for example, a host computer, and sends the picture signal 1309 included in reception print information in the control signal 1308 included in reception print information to the printer control section 1304 to the image-processing section 1305. And semiconductor laser 1306 is driven with the output signal of the image-processing section 1305. Moreover, the printer control section 1304 controls the image-processing section 1305 by the control signal 1310.
[0021] Drawing 22 is the block diagram showing the detail configuration of the image-processing section 1305 shown in drawing 21 .
[0022] The color processing section 1351 shown in drawing 22 receives a 124-bit RGB picture signal from the host interface 1303 shown in drawing 21 , and changes an input RGB code into the YMCK signal which carries out sequential correspondence to predetermined timing. That is, it changes into the 8-bit VDO signal with which an input RGB code is shown at M signal and a certain time at a Y signal and a certain time, and K signal is shown at C signal and a certain time at a certain time and which was mentioned above.
[0023] Drawing 23 is the timing chart of color signal transform processing which the color processing section 1351 shown in drawing 22 performs.
[0024] A1 and A2 in drawing 23 , A3, and A4 show the printing actuation to each same toner color as the printing actuation explained by drawing 20 . Furthermore, R1, G1, and B1 of drawing 23 show that the same RGB code is used to the printing actuation to each toner color. Moreover, a 2-bit color specification signal shows which color component each printing actuation is printing. "B" in each numeric value of the color specification signal of drawing 23 shows further again that the numeric value is a binary expression.
[0025] Now, as shown in drawing 22 , gamma amendment of the VDO signal of Y, M, C, and K from the color processing section 1351 is done in latter gamma amendment section 1352, and it is outputted as a 8-bit signal, and is inputted into the following Pulse-Density-Modulation section (the PWM section is called hereafter) 1353. In the PWM section 1353, a 8-bit picture signal is synchronized with the standup of an image clock (VCLK), and is latched by latch 1354. And the latched digital data is transformed to the analog voltage which corresponds by D/A converter 1355, and it inputs into an analog comparator 1356.
[0026] On the other hand, an image clock (VCLK) is inputted also into the triangular wave generating section 1358, is changed into a triangular wave and inputted into an analog

comparator 1356 here. An analog comparator 1356 compares the triangular wave signal from the triangular wave generating section 1358 with the analog signal from D/A converter 1355, and outputs the signal by which Pulse Density Modulation was carried out. This signal by which pulse width modulation was carried out is reversed with an inverter 1357, and it is obtained as an PWM signal shows drawing 24 . In addition, drawing 24 is a timing diagram explaining the PWM signal generation process of the PWM section 1353 shown in drawing 22 .
[0027] Therefore, when the 8-bit image data inputted into the PWM section 1353 serves as maximum "FF (H)", an PWM signal with the widest width of face is outputted, and on the other hand, an PWM signal with the narrowest width of face is outputted in the time of becoming the minimum value "00 (H)."

## EFFECT OF THE INVENTION

[Effect of the Invention] Since two or more units equipped with the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation and its busy condition were constituted free [ attachment and detachment ] on the body of image formation equipment according to the 1st invention concerning this invention as explained above, each unit can be identified and a busy condition can be recognized.
[0147] Since an information means reports the unit candidate by whom it was exchanged when according to the 2nd invention each attribute information memorized by the 1st nonvolatile memory of each attribute information that a judgment means is memorized by said 2nd non-volatile storage means, and each unit is read and it judges with it being inharmonious, the exchange existence of each unit can be recognized certainly and it can show clearly to a user.
[0148] Since according to the 3rd invention the 1st control means reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged and updates the attribute information on said 2nd non-volatile storage means when it judges with said judgment means being inharmonious, after exchange of each unit, it can continue, each unit can be identified, and a busy condition can be managed.
[0149] According to the 4th invention, since the unit candidate by whom it was exchanged is displayed on a control panel, said information means can identify and specify the unit exchanged by the user who works by the body side of an image processing system.
[0150] According to the 5th invention, since the unit candidate by whom it was exchanged is notified to an external device and it indicates by external, said information means can identify and specify the unit exchanged by the user who works by the exterior side which carried out remoteness from the body of an image processing system.
[0151] According to the 6th invention, since said information means prints and outputs the unit candidate by whom it was exchanged to a record medium, a user can do the follow up of the exchange hysteresis of each unit.
[0152] According to the 7th invention, since it considers as the development unit which develops the latent image formed in image support, any one unit can recognize the exchange existence of a development unit certainly, and can specify it to a user.
[0153] According to the 8th invention, since it considers as the development unit which develops the latent image formed in image support a color exception, any one unit can recognize certainly the exchange existence of the development unit according to each color, and can specify it to a

user.
[0154] According to the 9th invention, since it considers as the photo conductor unit by which a photo conductor is contained, any one unit can recognize the exchange existence of a photo conductor unit certainly, and can specify it to a user.
[0155] According to the 10th invention, since the identification information of the predetermined material [ exhausting ] used for image formation is included, said attribute information can identify the material [ exhausting ] of each unit, and can recognize each busy condition.
[0156] According to the 11th invention, since said attribute information includes the life information on the predetermined material [ exhausting ] used for image formation, it can notify the exchange stage of the material [ exhausting ] of each unit to timely to a user.
[0157] Since the attribute information the 2nd control means is remembered to be by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment is updated according to the 12th invention, the consumption material residue consumed out of each unit according to a busy condition can be managed, and an exchange stage can be specified.
[0158] According to the 13th invention, since the attribute information which is based for every image formation sequence of said body of image formation equipment, and is memorized by said 1st nonvolatile memory is updated, said 2nd control means can manage the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence on real time.
[0159] According to the 14th invention, since the attribute information which said body of image formation equipment is based for every image formation sequence activation of the count of predetermined, and is memorized by said 1st nonvolatile memory is updated, said 2nd control means can manage certainly the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation of the count of predetermined within a memory life, even if it is the storage which has a limit in the count of memory access.
[0160] In the 15th invention, said body of image formation equipment judges the image sequence activation existence at the time of possible [ of operation ], and said 2nd control means stops renewal of the attribute information memorized by said 1st nonvolatile memory based on this judgment result. Therefore, since unnecessary memory access is restricted when image formation sequence activation of the count of predetermined is not carried out even if it is the storage which has a limit in the count of memory access, the newest consumption material residue consumed out of each unit is certainly manageable within a memory life.
[0161] The collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit in the 16th invention, and to be in agreement is carried out. When it judges with it being inharmonious, while reporting the unit candidate by whom it was exchanged The attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged is read, the attribute information on said 2nd non-volatile storage means is updated, and the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment is updated further. Therefore, while being able to identify each unit and being able to recognize a busy condition, the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation is manageable.
[0162] Therefore, while identifying each unit exhausted with activation of an image formation

sequence according to an individual and being able to specify exchange existence to a user, the residue of the material [ exhausting ] etc. is managed and the effectiveness of being able to specify an exchange stage to a user is done so.

## TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the function of the body of a printer has evolved as explained above, it cannot be said that the function and management method of an article of consumption are still enough.
[0029] First, although it was the life of an article of consumption, the life detection approach of a photoconductor drum cartridge measured the potential on the front face of a drum, and only rough life detection of it was completed, for example. Therefore, warning to a user could not but be the binary information of whether there are lives of enough by turning on a warning lamp in the display panel of the body of a printer, or there is nothing.
[0030] Next, the trouble of the case where the troublesome thing referred to as noticing after putting into the body of a printer and printing breaks out occurring **ed the article of consumption which became a life once since there was no idea of ID number of a proper in each of an article of consumption until now and each condition was not able to be identified, although it is the management nature of an article of consumption again.
[0031] The purpose of the 1st invention which was made in order that this invention might cancel the above-mentioned trouble, and relates to this invention - the 16th invention By managing possible [ updating of attribute information such as a residue of each material / exhausting /, ], identifying each removable unit according to an individual based on the attribute information memorized to each unit to a body to image formation equipment While identifying each unit exhausted with activation of an image formation sequence according to an individual and being able to specify exchange existence to a user, it is offering the consumption material management method of the image formation equipment which manages the residue of the material [ exhausting ] etc. and can specify an exchange stage to a user, and image formation equipment.

## MEANS

[Means for Solving the Problem] The 1st invention concerning this invention constitutes two or more units equipped with the 1st nonvolatile memory which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition free [ attachment and detachment ] on the body of image formation equipment.
[0033] The 2nd non-volatile storage means which the 2nd invention concerning this invention reads each attribute information memorized by the 1st nonvolatile memory of each unit, and is memorized, The judgment means which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement, When it judges with said judgment means being inharmonious, an information means to report the unit candidate by whom it was exchanged is established.

[0034] When it judges with said judgment means of the 3rd invention concerning this invention being inharmonious, the 1st control means which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged, and updates the attribute information on said 2nd non-volatile storage means is established.
[0035] The 4th invention concerning this invention displays the unit candidate by whom said information means was exchanged on a control panel.
[0036] Said information means notifies the unit candidate by whom it was exchanged to an external device, and gives an external indication of the 5th invention concerning this invention.
[0037] Said information means prints the unit candidate by whom it was exchanged to a record medium, and the 6th invention concerning this invention outputs it.
[0038] The 7th invention concerning this invention makes any one unit the development unit which develops the latent image formed in image support.
[0039] Any one unit makes 8th invention concerning this invention the development unit which develops the latent image formed in image support a color exception.
[0040] Any one unit makes 9th invention concerning this invention the photo conductor unit by which a photo conductor is contained.
[0041] The 10th invention concerning this invention contains the identification information of the predetermined material [ exhausting ] by which said attribute information is used for image formation.
[0042] The 11th invention concerning this invention includes the life information on predetermined material [ exhausting ] that said attribute information is used for image formation.
[0043] The 12th invention concerning this invention establishes the 2nd control means which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment.
[0044] The 13th invention concerning this invention updates the attribute information which said 2nd control means is based for every image formation sequence of said body of image formation equipment, and is memorized by said 1st nonvolatile memory.
[0045] As for the 14th invention concerning this invention, as for said 2nd control means, said body of image formation equipment updates the attribute information which is based for every image formation sequence activation of the count of predetermined, and is memorized by said 1st nonvolatile memory.
[0046] Said 2nd control means judges the image [ body / of image formation equipment / said ] sequence activation existence at the time of possible [ of operation ], and the 15th invention concerning this invention stops renewal of the attribute information memorized by said 1st nonvolatile memory based on this judgment result.
[0047] The 1st nonvolatile memory which memorizes attribute information for the 16th invention concerning this invention to recognize the predetermined material [ exhausting ] used for image formation, and its busy condition, In the consumption material management method of the image formation equipment which considered two or more units equipped with the 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit as the configuration which can be freely detached and attached on the body of image formation equipment The judgment process which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement, The information process which reports the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious, The 1st

updating process which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged when it judges with said judgment means being inharmonious, and updates the attribute information on said 2nd non-volatile storage means, It has the 2nd updating process which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment.

[0048]

[Embodiment of the Invention]

The [1st operation gestalt] With reference to an accompanying drawing, the suitable operation gestalt of this invention is hereafter explained to a detail.

[0049] Drawing 1 is a cross-section block diagram explaining the configuration of the image formation equipment in which the 1st operation gestalt of this invention is shown, for example, has the resolution of 600 dots per inch (dpi), and corresponds to the color laser beam printer (henceforth CLBP or a printer) which performs image recording based on the multiple-value data with which each pixel of color component each was expressed by 8 bits. In addition, also in other operation gestalten mentioned later, the body 1 of equipment is used as a common operation gestalt.

[0050] In the body 1 of equipment, the transfer paper P to which paper was fed from the feed section 101 is pinched by gripper 103f in the tip, and is held at the periphery of the imprint drum 103.

[0051] At this time, a detector 8 detects the tip of a transfer paper P, and a Vertical Synchronizing signal (after-mentioned) is generated by that detecting signal. The latent image formed in each color from the optical unit 107 is development-ized by each color development counters Dy, Dc, Db, and Dm, two or more rotation copy is carried out to the form of an imprint drum periphery, and another color image is formed in the image support (henceforth a photoconductor drum) 100. Then, it dissociates from the imprint drum 103, is fixed to Form P in the fixing unit 104, and it is discharged by the paper output tray section 106 from a delivery unit 105.

[0052] The development counters Dy, Dc, Db, and Dm of each color have a rotation pivot to the both ends, and each is held pivotable centering on the shaft here at the development counter optional-feature section 108. By this, each development counters Dy, Dc, Db, and Dm can maintain the posture uniformly, even if the development counter optional-feature section 108 rotates centering on a revolving shaft 110 for development counter selection, as shown in drawing 1 . After the selected development counter's moving to a development location, the development counter optional-feature section 108 is pulled by solenoid 109a in the photoconductor drum 100 direction in the optional-feature maintenance frame 109 focusing on supporting-point 109b by the development counter and one, and moves in the photoconductor drum 100 direction.

[0053] Next, color picture formation actuation of the color laser beam printer of the above-mentioned configuration is explained concretely.

[0054] First, a photoconductor drum 100 is charged in a predetermined polarity with the electrification vessel 111 at homogeneity, on a photoconductor drum 100, the latent image of for example, M (Magenta) color is developed with the development counter Dm of M (Magenta) color by exposure by the laser beam light L, and the 1st toner image of M (Magenta) color is formed on a photoconductor drum 100 of it. While paper is fed to a transfer paper P to predetermined timing, the imprint bias voltage (+1.8kV) of a toner and antipole nature (for

example, plus polarity) is impressed to the imprint drum 103 on the other hand and the 1st toner image is imprinted by the transfer paper P on a photoconductor drum 100, electrostatic adsorption of the transfer paper P is carried out on the front face of the imprint drum 103. Then, M (Magenta) color toner which remains with a cleaner 112 is removed, and latent-image formation and the development process of the following color are equipped with a photoconductor drum 100.

[0055] Next, the 2nd latent image of C (cyanogen) color is formed of the laser beam light L on a photoconductor drum 100, subsequently the 2nd latent image on the photo conductor drum 100 is developed by the development counter Dc of C (cyanogen) color, and the 2nd toner image of C (cyanogen) color is formed. And the 2nd toner image of C (cyanogen) color is imprinted by the transfer paper P according to the location of the 1st toner image of M (Magenta) color previously imprinted by the transfer paper P. In the imprint of the toner image of these two amorous glance, just before a transfer paper P reaches the imprint section, +2.1kV bias voltage is impressed to the imprint drum 103.

[0056] Similarly, sequential formation of the 3rd and 4th latent image of Y (yellow) color and Bk (black) color is carried out on a photoconductor drum 100, alignment of each is carried out to the toner image which sequential development was carried out with development counters Dy and Db, and was previously imprinted by the transfer paper P, and the sequential imprint of each 3rd [ of Y (yellow) color and Bk (black) color ] and 4th toner image is carried out. Thus, it will be formed after the toner image of four colors has lapped on a transfer paper P. In the imprint of the toner image of these 3 amorous glance and four amorous glance, just before a transfer paper P reaches the imprint section, bias voltage (+2.5kV and +3.0kV) is impressed to the imprint drum 103, respectively.

[0057] Thus, whenever it imprints the toner image of each color, imprint bias voltage is made high for preventing decline in imprint effectiveness. The main causes of a fall of this imprint effectiveness are to charge the front face of a transfer paper P in imprint bias voltage and reversed polarity by aerial discharge (for the imprint drum front face which is supporting the transfer paper to also be charged a little), accumulate this electrification charge for every imprint, and for imprint electric field fall for every imprint that imprint bias voltage is fixed, when a transfer paper P separates from a photoconductor drum 100 after an imprint.

[0058] the imprint bias and like-pole nature which were impressed on the occasion of the imprint of the four above-mentioned amorous glance when a transfer paper tip arrived at an imprint starting position, and were impressed to the effective alternating voltage of 5.5kV (a frequency is 500Hz) (including immediately after just before) at the time of the imprint of the 4th toner image -- and the direct-current bias voltage of +3.0kV of this potential is made to superimpose, and it is impressed by the electrification machine 111. Thus, when a transfer paper tip arrives at an imprint starting position on the occasion of the imprint of four amorous glance, it is for preventing imprint nonuniformity to operate the electrification machine 111.

[0059] Especially, since it is easy to be conspicuous as a difference in a color even if slight imprint nonuniformity occurs in the imprint of a full color image, it is needed to impress necessary bias voltage to the electrification machine 111, and to make discharge actuation perform, as mentioned above. Then, when the point of the transfer paper P with which the superposition imprint of the toner image of four colors was carried out approaches a separation location, the separation pawl 113 approaches, and that tip contacts the front face of the imprint drum 103, and makes a transfer paper P separate from the imprint drum 103. The tip of the separation pawl 113 maintains a contact condition with an imprint drum front face, separates

from the retrodisplacement copy drum 103, and returns to the original location. While the electrification machine 111 operates until the transfer paper back end separates the imprint drum 103 from from, when the tip of a transfer paper arrives at the imprint starting position of the last color (the 4th amorous glance) as mentioned above, and it discharges the stored charge on a transfer paper (a toner and antipole nature) and making easy separation of the transfer paper P by the separation pawl 113, the aerial discharge at the time of separation is decreased. In addition, when the back end of a transfer paper P arrives at an imprint termination location (outlet of the nip section which a photoconductor drum 100 and the imprint drum 103 form), imprint bias voltage impressed to the imprint drum 103 is turned OFF (touch-down potential).

[0060] Bias voltage which could come, simultaneously was being impressed to the electrification machine 111 is turned OFF. Next, it is conveyed by the fixing assembly (unit) 104, it is fixed to the toner image on a transfer paper here, and the separated transfer paper P is discharged on a paper output tray 106.

[0061] Next, actuation of the image formation by laser beam scan is explained.

[0062] In drawing 1 , 107 is an optical unit and is constituted by a detector 9, semiconductor laser 120, the polygon mirror 121, the scanner motor 122, the lens 123, and the mirror 125. If paper is fed to a transfer paper P and the tip is conveyed by the imprint drum 103, synchronizing with it, a picture signal VDO will be outputted to semiconductor laser 120 at 1 page, light beam L modulated by the picture signal VDO will be injected towards the polygon mirror 121 rotated by the scanner motor 122, and the injected light beam L will be led to a photoconductor drum 100 by the lens 123 and the mirror 125.

[0063] Moreover, if light beam L is injected, light beam L will be detected by the detector 9 arranged on a horizontal-scanning shaft, and BD (beam detection) signal used as a Horizontal Synchronizing signal is outputted. Consequently, synchronizing with BD signal, scan exposure of the photoconductor drum 100 is carried out by light beam L, and an electrostatic latent image is formed.

[0064] The color laser beam printer of this operation gestalt performs an image output in the resolution of 600 dots per inch (dpi) through the above image formation processes.

[0065] As input data of this equipment, the color picture data (for example, data expressed of a RGB component) generated with a host computer (henceforth a host), the image data which generated with other image data generation equipments (still image recorder etc.), and was stored in some storages can be considered. For this reason, as shown in this equipment at drawing 1 , the signal-processing section 4 which processes the printer controller 2 which receives the image information from a host and generates image data, and its image data is formed.

[0066] With some operation gestalten shown below, the color picture data sent by the host are considered as input data.

[0067] Drawing 2 is the block diagram showing the functional configuration of the printer 1 shown in drawing 1 .

[0068] In drawing 2 , a printer 1 receives the image information of the predetermined description language sent from host computers (henceforth a host) 1000 and 1001 through a network 5, develops, and consists of the printer controllers 2 and printer engine 3 which output this as a YMCBk picture signal 6 with which each color component consists of 8 bits (D0-D7). Or since hosts 1000 and 1001 send out bit data, such as RGB read by the image reader etc., as image information 5, they process a printer controller 2 in this case, without interpreting this.

[0069] Between a printer controller 2 and printer engine 3, various picture signals are delivered and received in the form of serial communication 15 besides picture signal 6. There are a page

(direction of vertical scanning) synchronizing signal (PSYNC) sent out to a printer controller 2 from printer engine 3, a synchronizing signal (LSYNC) of a main scanning direction, a 1-bit attribute assignment signal (PHIMG) sent out to printer engine 3 from a printer controller 2, and a clock (VCLK) for data transfer in these picture signals.
[0070] Here, an attribute assignment signal (PHIMG) is a signal which specifies the Rhine consistency of the image outputted from a printer, and 600dpi is shown for 300dpi at the time of PHIMG= "L" at the time of PHIMG="H".
[0071] A printer controller 2 outputs the 8-bit signal of each color component for a picture signal 6 with a 1-bit attribute assignment signal (PHIMG) synchronizing with the clock (VCLK) for data transfer. 208 is a display and displays various information, such as a busy condition of the material [ exhausting ] which receives from the print controller 2. Moreover, a display 208 consists of touch panels and a user may enable it to input various setup to a printer 1.
[0072] Drawing 3 is the block diagram showing the functional configuration of the printer engine 3 shown in drawing 2 .
[0073] In drawing 3 , uniform rotation of the scanner motor 122 is carried out by the motor control circuit 12 (the well-known phase control circuit which is not illustrated is built in) so that dividing of the reference clock from the criteria oscillator 10 contained in the optical unit 107 may be carried out by the counting-down circuit 11 and phase contrast of a dividing clock and the feedback signal from the scanner motor 122 may be made into predetermined phase contrast. And rotation of the scanner motor 122 is transmitted to the polygon mirror 121, and uniform rotation of the polygon mirror 121 is carried out.
[0074] On the other hand, uniform rotation of the imprint drum 103 is carried out by the drive motor (un-illustrating), the tip of the recording paper P on the imprint drum 103 is detected by the detector 8, and a Vertical Synchronizing signal (VSYNC) is outputted to the signal-processing section 4. And the image tip of each color is prescribed by the Vertical Synchronizing signal (VSYNC). After a Vertical Synchronizing signal (VSYNC) is outputted, synchronizing with BD signal, a picture signal (VDO) is sent out to semiconductor laser 120 one by one by making into a Horizontal Synchronizing signal (HSYNC) BD signal generated by the detector 9.
[0075] Moreover, CPU14 which the signal-processing section 4 builds in performs a printer controller 2 and serial communication, exchanges control signals, and synchronizes actuation of a printer controller 2 and printer engine 3. Moreover, CPU14 is communicating the backup memory 230 with the development counter memory 203-206 and the sensitization drum memory 207 through serial communication Rhine 202. Said development counter memory 203-206 is EEPROM attached in the development counter of each color, and the sensitization drum memory 207 is EEPROM attached in the photoconductor drum cartridge.
[0076] The timing of the above-mentioned Vertical Synchronizing signal (VSYNC) in an image formation process, a Horizontal Synchronizing signal (BD), and a picture signal (VDO) comes to be shown in drawing 4 . In addition, drawing 4 is drawing 2 and a timing chart explaining actuation of drawing 3 .
[0077] Hereafter, correspondence and its operation with this operation gestalt and each means of the 1st - the 15th invention are explained with reference to drawing 3 etc.
[0078] Since the 1st invention constituted two or more units equipped with the 1st nonvolatile memory (the development counter memory 203-206, the sensitization drum memory 207 which consist of these operation gestalten, for example by EEPROM) which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition free [ attachment and detachment ] on the body of image formation

equipment, it can identify each unit and can recognize a busy condition.
[0079] The 2nd invention is the 1st nonvolatile memory (with this operation gestalt) which memorizes the attribute information for recognizing the predetermined material [ exhausting ] used for image formation, and its busy condition. For example, two or more units equipped with the development counter memory 203-206 which consists of EEPROMs, and the sensitization drum memory 207 are constituted free [ attachment and detachment ] on the body of image formation equipment. And the 2nd non-volatile storage means which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit (backup memory 230), Each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit is read. The judgment means (the control program memorized by ROM or other memory resources which CPU14 does not illustrate is performed, and judgment processing is carried out) which carries out the collating judging of whether to be in agreement, When it judges with said judgment means being inharmonious, it has an information means (the control program memorized by ROM or other memory resources which CPU14 does not illustrate is performed, and information processing is carried out) to report the unit candidate by whom it was exchanged. When each attribute information memorized by each attribute information that CPU14 is memorized by the backup memory 230, the development counter memory 203-206, and the sensitization drum memory 207 is read and it judges with it being inharmonious Since the unit candidate by whom it was exchanged is reported, the exchange existence of each unit can be recognized certainly and it can show clearly to a user.
[0080] Since the 3rd invention reads the attribute information memorized by the development counter memory 203-206 for which it was exchanged, or the sensitization drum memory 207 and updates the attribute information on a backup memory 230 when it judges with CPU14 being inharmonious, after exchange of each unit, it can continue, and it can identify each unit, and can manage a busy condition.
[0081] Since the unit candidate by whom it was exchanged is displayed on a control panel (display 208 shown in drawing 2 ), CPU14 identifies the unit exchanged by the user who works by the body side of an image processing system, and the 4th invention can specify it.
[0082] Since CPU14 notifies the unit candidate by whom it was exchanged to an external device (host computer 1000) and indicates by external (monitor 1000A), from the body of an image processing system, the 5th invention identifies the unit exchanged by the user who works by the exterior side which carried out remoteness, and can specify it.
[0083] Since CPU14 prints the unit candidate by whom it was exchanged to a record medium and the 6th invention outputs, a user can do the follow up of the exchange hysteresis of each unit.
[0084] Since the 7th invention considers as the development unit which develops the latent image formed in image support, any one unit can recognize the exchange existence of a development unit certainly, and it can specify it to a user.
[0085] Since any one unit makes 8th invention the development unit which develops the latent image formed in image support a color exception, it can recognize certainly the exchange existence of the development unit according to each color, and it can specify it to a user.
[0086] Since the 9th invention considers as the photo conductor unit by which a photo conductor is contained, any one unit can recognize the exchange existence of a photo conductor unit certainly, and it can specify it to a user.
[0087] Since said attribute information contains the identification information of the predetermined material [ exhausting ] used for image formation, the 10th invention can identify

the material [ exhausting ] of each unit, and can recognize each busy condition.
[0088] Since said attribute information includes the life information on the predetermined material [ exhausting ] used for image formation, the 11th invention can notify the exchange stage of the material [ exhausting ] of each unit to timely to a user.
[0089] Since the 12th invention updates the attribute information CPU14 is remembered to be by the backup memory 230 based on the image formation sequence condition of the body of image formation equipment, it can manage the consumption material residue consumed out of each unit according to a busy condition, and can specify an exchange stage.
[0090] Since CPU14 updates the attribute information which is based for every image formation sequence of said body of image formation equipment, and is memorized by the development counter memory 203-206 and the sensitization drum memory 207, the 13th invention can manage the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence on real time.
[0091] Since CPU14 updates the attribute information which said body of image formation equipment is based for every image formation sequence activation of the count of predetermined, and is memorized by the development counter memory 203-206 and the sensitization drum memory 207, even if the 14th invention is a storage which has a limit in the count of memory access, it can manage certainly the newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation of the count of predetermined within a memory life.
[0092] In the 15th invention, CPU14 judges the image [ body / of image formation equipment / said ] sequence activation existence at the time of possible [ of operation ]. Since renewal of the attribute information memorized by the development counter memory 203-206 and the sensitization drum memory 207 based on this judgment result is stopped Since unnecessary memory access is restricted when the image formation sequence of the count of predetermined is not performed even if it is the storage which has a limit in the count of memory access, the newest consumption material residue consumed out of each unit is certainly manageable within a memory life.
[0093] Drawing 5 is the block diagram showing the configuration of the signal-processing section 4 shown in drawing 3 , and the signal-processing section 4 in this operation gestalt is divided roughly into the Rhine memory 20 and the halftone processing section by PWM.
[0094] The Rhine memory 20 carries out actuation read with the image clock (PCLK) of printer engine 3, after storing the multiple-value image data (D0-D7) and attribute assignment signal (PHIMG) which are sent out from a printer controller 2 with the clock (VCLK) for data transfer.
[0095] Moreover, it consists of the halftone processing section by PWM, gamma amendment section 21, the D/A transducer 22, comparators 23 and 24, the triangular wave generating sections 26 and 27, and a selector 28. And gamma amendment of the multiple-value image data from the Rhine memory 20 is done in gamma amendment section 21, and after being changed into an analog signal by the D/A transducer 22, it is inputted into the plus input terminal (+) of comparators 23 and 24. On the other hand, the output signal of the triangular wave generating sections 26 and 27 which generate a triangular wave signal based on the clock of 1/2PCLK which carried out dividing of it to the image clock (PCLK) is inputted into the negative input terminal (-) of comparators 23 and 24.
[0096] And each comparators 23 and 24 compare these 2 signal, and generate the signal of pulse width according to a multiple-value picture signal. An PWM signal for resolution to form [ an PWM signal for resolution to form the image of 600dpi from a comparator 23 ] the image of

300dpi from a comparator 24 on the other hand is outputted. The output signal of these two comparators 23 and 24 is inputted into a selector 28.
[0097] According to the attribute assignment signal (PHIMG) inputted, at the time of PHIMG="H", a selector 28 chooses the PWM signal (it is used for the image formation of resolution 300dpi) from a comparator 24, on the other hand, chooses the PWM signal (it is used for the image formation of resolution 600dpi) from a comparator 23, and sends it out to the laser mechanical component 120 as a picture signal (VDO) at the time of PHIMG= "L."
[0098] Drawing 6 is a timing chart explaining the signal-processing timing of the signal-processing section 4 shown in drawing 3 , and corresponds to the timing chart of the various control signals relevant to the PWM signal generation process in the case of having no screen angle.
[0099] Hereafter, the configuration of serial communication Rhine 202 between each memory 203-207 shown in drawing 3 with reference to drawing 7 - drawing 9 and CPU14 is explained.
[0100] Drawing 7 is a block diagram explaining the configuration of the interface circuitry in the signal-processing section 4 shown in drawing 3 .
[0101] In drawing, 211,212,213 is a digital transistor. 210 is an PNP mold power transistor, and when "LOW" is outputted from the port PO of CPU14, it supplies a power source to VCC Rhine of the signal group 202. CPU14 will open wide VCC currently supplied to each memory by setting Port PO to "High", if it detects that the user opened the door which a printer 1 does not illustrate, and it turns off power. The clock signal for [ CS / which are supplied to the Magenta development counter memory 203 which consists of EEPROMs which show VCC of the signal group 202 to drawing 8 / the power source and CS ] serial communication in a chip select signal and SCK, and DI express the input data to EEPROM, and DO expresses the output signal from EEPROM.
[0102] VCC, SCK, DI, DO, and GND serve as each memory common bus among the above signals, CS considers as the signal line (from the port P1 of CPU14 - a port P5 to an output) which became independent in each memory 203-207, respectively, and CS signal of the backup memory 230 in the signal-processing section 4 is outputted from the port P6 of CPU14.
[0103] Drawing 8 is a block diagram explaining the example of a circumference circuit of the Magenta development counter memory 203 shown in drawing 3 , and has given the same sign to the same thing as drawing 7 . In addition, the circuit concerned consists of electric substrates, and as shown in drawing 9 , it is included in the development cartridge (development counter).
[0104] As for a digital transistor and 217-219,221-223, in drawing 8 , resistance, and 224-226 is [ 220 ] capacitors.
[0105] This circuitry is communalized to both cyanogen development counter memory yellow development counter memory black development counter memory and a sensitization drum memory.
[0106] Drawing 9 is a top view explaining the configuration of the Magenta development counter with which the printer 1 shown in drawing 1 can be equipped.
[0107] For 227, as for a memory circuit substrate and 203, in drawing, the body of a development counter and 228 are [ EEPROM and 229 ] connectors. The signal of CPU14 and EEPROM203 in the signal-processing section 4 is connected by the connector 229.
[0108] Drawing 10 is drawing showing the timing chart for explaining data reading / data write-in timing to EEPROM203 of the development counter 227 shown in drawing 9 .
[0109] I/O of the data to this EEPROM203 is performed by serial communication. The DS of the serial communication consists of a start "1" bit, an operation code "2" bit showing the contents of

the instruction, the address, and data.
[0110] If this drawing (a) shows the time of reading and sends out a start, an operation code, and the address from the Maine control CPU 14 first synchronizing with Clock SCK, data will be outputted from the serial data output terminal DO synchronizing with Clock SCK. This drawing (b) shows the time of writing, and the start sent out from the Maine control CPU 14 synchronizing with Clock SCK, an operation code, the address, and data are written in from the serial data input terminal DI.
[0111] Next, the contents stored in each memory (the above-mentioned memory 203-206,207) are explained.
[0112] Color information (a Magenta, cyanogen, yellow, or black is specified), the count of reuse, a manufacture manufacture name, ID number (proper number of the development counter), and the remnant service life to expect are stored in each development counter memory 203-206. Among these, color information, a manufacture manufacture name, and ID number are information stored at the time of manufacture. In the case of the development counter in which a toner stuffing substitute is possible, the count of reuse is repacked and updates a memory content at works. Moreover, the remnant service life to expect is information which expects from the print number of sheets which used the development counter, and is updated for every print.
[0113] On the other hand, a manufacture manufacture name, a manufacture date, ID number (proper number of the photoconductor drum), and the remnant service life to expect are stored in the sensitization drum memory 207. Among these, a manufacture manufacture name, a manufacture date, and ID number are information in which it is stored at the time of manufacture. Moreover, the remnant service life to expect is information which expects from the print number of sheets which used the development counter, and is updated for every print.
[0114] Drawing 11 is drawing showing the memory map of the development counter memory 203-206 according to each color shown in drawing 3 , and drawing 12 is drawing showing the memory map of the sensitization drum memory 207 shown in drawing 3 .
[0115] Drawing 13 is a flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 1st operation gestalt of this invention is shown. In addition, (1) - (7) shows each step, corresponds to the processing which paid its attention to the memory access of the period from powering on of this printer to a power source OFF, and performs and processes the control program memorized by ROM or other memory resources which CPU14 does not specifically illustrate.
[0116] First, if the power source of a printer 1 is turned on, while judging whether the contents of the backup memory 230 and the contents of each development counter memory 203-206 which have memorized the former condition are compared first, and it is in agreement When it judges whether the contents of the backup memory 230 are compared with the contents of the sensitization drum memory 207, and it is in agreement and it is judged that (1) and the result compared, respectively were in agreement, it judges that the development counter and photoconductor drum according to each color are the same as that of a former thing, and progresses to a step (4).
[0117] On the other hand, when it is judged at a step (1) that it is inharmonious It judges in which article of consumption (the development counter according to each color, photoconductor drum) it was exchanged from conflicting contents by collating with the information on each memory (EEPROM) which can be read, and a backup memory 230. While updating the contents of the backup memory 230, it displays on the display 208 shown [ (2) and coincidence ] to the user at information, for example, drawing 2 , or host computer 1000 grade, and it is certain (3)

which carries out ** print-out and is reported.
[0118] The contents compared concretely are the manufacture manufacture name shown in drawing 11 , ID number, and the manufacture manufacture name shown in drawing 12 and ID number. In addition, the approach of information is described later.
[0119] Next, whenever it supervises that the print was performed and a print is performed, the contents of (4), each development counter memory 203-206, and the sensitization drum memory 207 are updated (5). As concrete contents of updating, for example the print life number of sheets of the development counter according to each color, and a photoconductor drum It writes in each development counter memory 203-206 and the sensitization drum memory 207 at the time of manufacture. It always supervises through the door sensor which carries out the down count whenever it prints one sheet, and does not illustrate that the front door (not shown) was opened, and if it detects having been opened, the same processing as return will be repeated to (6) and a step (1).
[0120] And if return and the same processing are repeated to (7) and a step (4) and the power source of a printer 1 is turned off until the power source of a printer 1 is turned off, a series of sequences will be ended.
[0121] Next, the approach of information is explained. It roughly divides and there is three following approach (A) - (C).
[0122] (A) Display information on a printer controller 2 through a network 5 with the monitor of the host computers 1000 and 1001 which are user terminals through serial communication 15 from delivery and there.
[0123] (B) Through serial communication 15, indicate information at a printer controller 2 and indicate the information by delivery from delivery and there at the display panel 208 of a printer 1.
[0124] (C) Print and print out this information. Or this information is printed out on a power-on page.
[0125] Drawing 14 - drawing 16 are drawings showing the example of a consumption material management report notification in the image formation equipment concerning this invention. Drawing 14 It corresponds to the information approach of the above (A), and corresponds to the example displayed on monitor 1000A of a computer 1000 as a management report REPORT1. Drawing 15 It corresponds to the information approach of the above (B), and corresponds to the example displayed on the display 208 shown in drawing 2 as a management report REPORT2, and drawing 16 corresponds to the information approach of (C), and shows the example printed out as a management report REPORT3 from printer engine 3.
[0126] As shown in drawing 14 , when this is using the common printer at two or more terminals by reporting to a user terminal, it becomes possible to get to know the condition of the article of consumption of a printer also at the terminal of a printer and the physically distant location. In addition, not only when an article of consumption is changed, but when a user wants to know this information, you may make it see article-of-consumption information at a terminal.
[0127] Moreover, if it displays on the display panel 208 of a printer as shown in drawing 15 , it is the spot which exchanged articles of consumption, and the exchange person can check the article-of-consumption condition. For example, when it exchanges for a used development counter, the residual life time can recognize by the display panel 208.
[0128] Furthermore, if information is printed out as shown in drawing 16 , it will remain as hysteresis.
[0129] In addition, although this operation gestalt explained the case where memory 203-207

was constituted from an EEPROM, other nonvolatile memory is sufficient. For example, when requiring only read-only information, such as color information shown in drawing 11 , a manufacture manufacture name, and ID number, ultraviolet-rays elimination type ROM is sufficient.

[0130] Moreover, CPU and EEPROM may put EEPROM built-in [ which was one-chip-ized / CPU ] on an article of consumption. In this case, the communication link with CPU14 of the signal-processing section 4 can simplify more.

[0131] Furthermore, the approach of forming a sensor in the body side of a printer, and attaching an information supporter called a magnetic tape bar code in an article-of-consumption side may be used.

[0132] Moreover, about the calculation approach of residual life time, in addition to the count of mere print number of sheets, more exact detection may be performed combining a conventional photo sensor and a conventional potential sensor, and the result may be added to the memory of an article of consumption.

[0133] The [2nd operation gestalt] Drawing 17 is a flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 2nd operation gestalt of this invention is shown. In addition, (1) - (9) shows each step and corresponds to the processing which paid its attention to the memory access of the period of the power up of a printer 1 to the time of OFF.

[0134] First, the register is incremented, whenever it will reset the register which counts the print number of sheets in CPU14 of (1) and the signal-processing section 4 and will perform print actuation, if the power source of a printer 1 is turned on (2). And it judges whether said register value showed ten sheets, and if it becomes YES, CPU14 will read the residual life time of each development counter memory 203-206 and the sensitization drum memory 207, will rewrite the contents of memory 203-207 to (4) and the value which carried out the decrement only of "10" from the value, and will return to (3) and a step (1).

[0135] On the other hand, when it is judged that the register value does not show ten sheets at a step (4) Next, CPU14 supervises the residual life time of each development counter memory 203-206 and the sensitization drum memory 207. It judges whether it became predetermined residual life time, for example, "100" **, "50" **, "10" **, and "0" **, and in (5) and Yes, it reports to a user, and it returns to processing of (6) and a step (1). In addition, suppose that it is the same as that of the 1st operation gestalt about the information approach to a user.

[0136] On the other hand, in No, it progresses to a step (7) at a step (5). subsequently, a ******** [ that the power source of a printer 1 was turned off ] -- judging -- (7) -- if it becomes NO, return and the same sequence will be repeated to a step (1).

[0137] On the other hand, when it judges whether the value of the print number-of-sheets register of CPU14 is "0" when it is judged that the power source was turned off and (8) and YES, i.e., one sheet, do not print at a step (7), processing is ended as it is.

[0138] On the other hand, when it is judged at a step (8) that the print number-of-sheets register of CPU14 is more than "1", after rewriting the contents of residual life time of each development counter memory 203-206 and the sensitization drum memory 207 by the number of sheets, (9) and this sequence are ended.

[0139] Hereafter, correspondence and its operation with this operation gestalt and each process of the 16th invention are explained with reference to drawing 13 , drawing 17 , etc.

[0140] The 1st nonvolatile memory which memorizes attribute information for the 16th invention to recognize the predetermined material [ exhausting ] used for image formation, and

its busy condition (the development counter memory 203-206, sensitization drum memory 207), In the consumption material management method of the image formation equipment which considered two or more units equipped with the 2nd non-volatile storage means (backup memory 230) which reads and memorizes each attribute information memorized by the 1st nonvolatile memory of each unit as the configuration which can be freely detached and attached on the body of image formation equipment The judgment process which carries out the collating judging of whether to read each attribute information memorized by the 1st nonvolatile memory of each attribute information memorized by said 2nd non-volatile storage means and each unit, and to be in agreement (step of drawing 13 (1)), The information process which reports the unit candidate by whom it was exchanged when it judges with said judgment means being inharmonious (step of drawing 13 (3)), The 1st updating process which reads the attribute information memorized by the 1st nonvolatile memory of a unit for which it was exchanged when it judges with said judgment means being inharmonious, and updates the attribute information on said 2nd non-volatile storage means (step of drawing 13 (2)), the 2nd updating process (the step (5) of drawing 13 --) which updates the attribute information memorized by said 1st nonvolatile memory based on the image formation sequence condition of the body of image formation equipment The control program memorized by ROM or other memory resources which CPU14 which showed step [ of drawing 17 ] (1) - (9) to drawing 3 does not illustrate is performed. The newest consumption material residue consumed out of each unit according to the busy condition for every image formation sequence activation is manageable.

[0141] In a full color print (i.e., when the development counter of all colors is used), the above explanation is the thing of an about. For example, in the case of the printing mode of black monochrome, only the contents of the black development counter memory 206 and the sensitization drum memory 207 should be updated.

[0142] As explained above, with this operation gestalt, the following two effectiveness can be considered by reducing the count of rewriting of each development counter memory 203-206 or the sensitization drum memory 207. The 1st is fully being able to have a margin to the life of the own count of rewriting of a memory device. For example, the count of writing of EEPROM is 100,000 or less times. On the other hand, the number of photoconductor drum lives is about 20,000. According to this operation gestalt, rewriting of the sensitization drum memory 207 becomes 2000 times, will be used by 1/50 of the lives of EEPROM, and can have sufficient margin.

[0143] I hear that the 2nd can fully lower the probability which destroys a memory content, and there are. Breakage of a memory content is mainly generated during write-in actuation. Although this probability is very low, reliance can be further raised by reducing this count of writing.

[0144] In addition, even if it applies this invention to the system which consists of two or more devices, it may be applied to the equipment which consists of one device. Moreover, it cannot be overemphasized that this invention can be applied also when attained by supplying a program to a system or equipment. In this case, that system or equipment becomes possible [ enjoying the effectiveness of this invention ] by reading the storage which stored the program expressed by the software for attaining this invention to this system or equipment.

[0145] Furthermore, the system or equipment becomes possible [ enjoying the effectiveness of this invention ] by downloading the program expressed by the software for attaining this invention by the communications program, and reading it from the database on a network.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is a cross-section block diagram explaining the configuration of the image formation equipment in which the 1st operation gestalt of this invention is shown.
[Drawing 2] It is the block diagram showing the functional configuration of the printer shown in drawing 1 .
[Drawing 3] It is the block diagram showing the functional configuration of the printer engine shown in drawing 2 .
[Drawing 4] They are drawing 2 and a timing chart explaining actuation of drawing 3 .
[Drawing 5] It is the block diagram showing the configuration of the signal-processing section shown in drawing 3 .
[Drawing 6] It is a timing chart explaining the signal-processing timing of the signal-processing section shown in drawing 3 .
[Drawing 7] It is a block diagram explaining the configuration of the interface circuitry in the signal-processing section shown in drawing 3 .
[Drawing 8] It is a block diagram explaining the example of a circumference circuit of the Magenta development counter memory shown in drawing 3 .
[Drawing 9] It is a top view explaining the configuration of the Magenta development counter with which the printer shown in drawing 1 can be equipped.
[Drawing 10] It is drawing showing the timing chart for explaining data reading / data write-in timing to EEPROM of the development counter shown in drawing 9 .
[Drawing 11] It is drawing showing the memory map of the development counter memory according to each color shown in drawing 3 .
[Drawing 12] It is drawing showing the memory map of the sensitization drum memory shown in drawing 3 .
[Drawing 13] It is the flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 1st operation gestalt of this invention is shown.
[Drawing 14] It is drawing showing the example of a consumption material management report notification in the image formation equipment concerning this invention.
[Drawing 15] It is drawing showing the example of a consumption material management report notification in the image formation equipment concerning this invention.
[Drawing 16] It is drawing showing the example of a consumption material management report notification in the image formation equipment concerning this invention.
[Drawing 17] It is the flow chart which shows an example of the consumption material management procedure of the image formation equipment in which the 2nd operation gestalt of this invention is shown.
[Drawing 18] It is the sectional view showing the configuration of conventional full color printer equipment.
[Drawing 19] It is a block diagram explaining the control configuration of the full color printer equipment shown in drawing 18 .
[Drawing 20] It is the timing chart which shows the relation between the TOPSNS signal shown in drawing 19 , and a VDO signal.
[Drawing 21] It is the block diagram showing the functional configuration of conventional full

color printer equipment.
[Drawing 22] It is the block diagram showing the detail configuration of the image-processing section shown in drawing 21 .
[Drawing 23] It is the timing chart of color signal transform processing which the color processing section shown in drawing 22 performs.
[Drawing 24] It is a timing diagram explaining the PWM signal generation process of the PWM section shown in drawing 22 .
[Description of Notations]
4 Signal-Processing Section
203 Development Counter Memory
204 Development Counter Memory
205 Development Counter Memory
206 Development Counter Memory
207 Sensitization Drum Memory
230 Backup Memory

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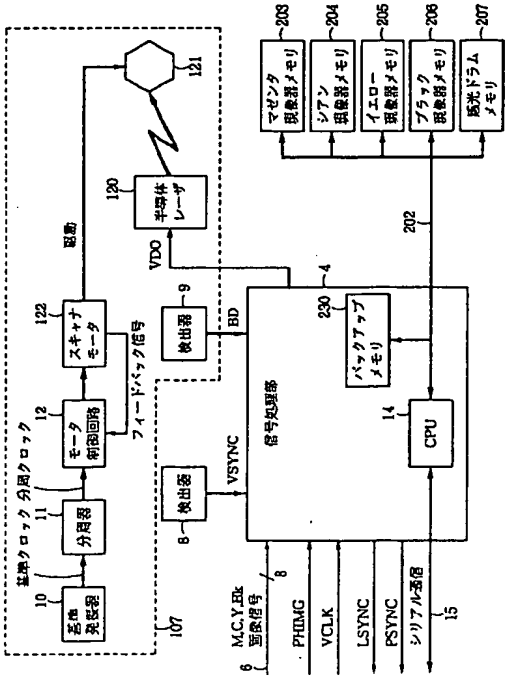
(54)【発明の名称】　画像形成装置および画像形成装置の消耗材管理方法

(57)【要約】
【課題】　画像形成シーケンスの実行に伴って消耗される各ユニットを個別に識別して交換有無をユーザに明示することである。
【解決手段】　ＣＰＵ１４がバックアップメモリ２３０に記憶される各属性情報と現像器メモリ２０３～２０６，感光ドラムメモリ２０７に記憶される各属性情報を読み出して不一致と判定した場合に、交換されたユニット候補を報知する構成を特徴とする。



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【特許請求の範囲】

【請求項１】　画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリを備える複数のユニットを画像形成装置本体に着脱自在に構成したことを特徴とする画像形成装置。

【請求項２】　各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段と、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定手段と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知手段とを具備したことを特徴とする請求項１記載の画像形成装置。

【請求項３】　前記判定手段が不一致と判定した場合に、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新する第１の制御手段を具備したことを特徴とする請求項２記載の画像形成装置。

【請求項４】　前記報知手段は、交換されたユニット候補を操作パネルに表示することを特徴とする請求項２記載の画像形成装置。

【請求項５】　前記報知手段は、交換されたユニット候補を外部装置に通知して外部表示することを特徴とする請求項２記載の画像形成装置。

【請求項６】　前記報知手段は、交換されたユニット候補を記録媒体に印刷して出力することを特徴とする請求項２記載の画像形成装置。

【請求項７】　いずれか１つのユニットは、像担持体に形成された潜像を現像する現像ユニットであることを特徴とする請求項１記載の画像形成装置。

【請求項８】　いずれか１つのユニットは、像担持体に形成された潜像を色別現像する現像ユニットであることを特徴とする請求項１記載の画像形成装置。

【請求項９】　いずれか１つのユニットは、感光体が収納される感光体ユニットであることを特徴とする請求項１記載の画像形成装置。

【請求項１０】　前記属性情報は、画像形成に使用される所定の消耗材の識別情報を含むことを特徴とする請求項１記載の画像形成装置。

【請求項１１】　前記属性情報は、画像形成に使用される所定の消耗材の寿命情報を含むことを特徴とする請求項１記載の画像形成装置。

【請求項１２】　画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新する第２の制御手段を具備したことを特徴とする請求項１記載の画像形成装置。

【請求項１３】　前記第２の制御手段は、前記画像形成装置本体の画像形成シーケンス毎に基づいて前記第１の

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不揮発性メモリに記憶されている属性情報を更新することを特徴とする請求項１２記載の画像形成装置。

【請求項１４】　前記第２の制御手段は、前記画像形成装置本体が所定回数の画像形成シーケンス実行毎に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新することを特徴とする請求項１２記載の画像形成装置。

【請求項１５】　前記第２の制御手段は、前記画像形成装置本体が動作可能時における画像シーケンス実行有無を判定し、該判定結果に基づいて前記第１の不揮発性メモリに記憶されている属性情報の更新を休止することを特徴とする請求項１２記載の画像形成装置。

【請求項１６】　画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリと、各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段とを備える複数のユニットを画像形成装置本体に着脱自在の構成とした画像形成装置の消耗材管理方法において、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定工程と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知工程と、前記判定手段が不一致と判定した場合に、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新する第１の更新工程と、画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新する第２の更新工程とを有することを特徴とする画像形成装置の消耗材管理方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、画像形成処理毎に消耗される異なる複数の消耗材を交換可能な画像形成装置および画像形成装置の消耗材管理方法に関するものである。

【０００２】

【従来の技術】近年になって、プリンタ装置がカラー化され、ユーザの様々な表現手段として利用されるようになってきている。特に、電子写真方式を用いたカラーページプリンタ装置はその静粛性、その高品質な画質および高速プリンティングの点で注目されてきている。

【０００３】カラーページプリンタ装置の１つであるフルカラーレーザビームプリンタ装置は、感光体上にレーザビームを主走査方向に走査して第１のトナーを用いて第１の現像を行った後、転写ドラム上の記録紙などの記録媒体上に転写する工程を第１の工程とするなら、これに続いて、第２～第４のトナーを用いて引き続き、第２、第３および第４の工程により多色画像の画像形成と

記録を行う。

【０００４】このような４つの工程によって、Ｙ（イエロー），Ｍ（マゼンタ），Ｃ（シアン），Ｋ（黒）の各色トナーにより画像形成を行って、これらを記録媒体に多重転写してカラー画像を得ることが電子写真方式のカラーレーザビームプリンタ装置では一般に知られている。

【０００５】次に、このような従来のフルカラープリンタ装置における多色画像の記録方法を図１８，図１９を参照して説明する。

【０００６】図１８は、従来のフルカラープリンタ装置の構成を示す断面図であり、図１９は、図１８に示すフルカラープリンタ装置の制御構成を説明するブロック図である。

【０００７】まず、図１８に示すように一定速度で矢印方向に回転する感光ドラム１２０１が帯電器１２０４によって所定の極性，所定の電圧に帯電される。次いで、記録紙Ｐが給紙カセット１２１５から給紙ローラ１２１４により所定のタイミングで１枚ずつ給紙される。記録紙Ｐの先端が検出器１２０２より検出されると、画像信号ＶＤＯ（各画素各色成分８ビット）により変調されてレーザ光Ｌが半導体レーザ１２０５から、スキャナモータ１２０６により駆動されるポリゴンミラー１２０７に向けて射出され、ポリゴンミラー１２０７により反射された後、レンズ１２０８およびミラー１２０９を経て、感光ドラム１２０１に導かれ、感光ドラム１２０１上を走査する。

【０００８】一方、検出器１２０２からの信号は垂直同期信号ＴＯＰＳＮＳとして、図１９に示す画像形成部１２５０に出力される。また、検出器１２１７がレーザ光Ｌを検知すると、水平同期信号となるビームディテクト信号（ＢＤ信号）を画像形成部１２５０に出力する。そして、画像信号ＶＤＯがＢＤ信号に同期して順次、半導体レーザ１２０５に送出される。

【０００９】スキャナモータ１２０６は、基準発振器１２２０からの信号Ｓ１を分周する分周器からの信号Ｓ２に従って、一定速度で基点するように、モータ制御回路１２２５により制御される。そして、ＢＤ信号に同期して感光ドラム１２０１が走査露光され、次いで、イエロー色のトナーを有した現像器１２０３Ｙにより第１静電潜像が現像され、感光ドラム１２０１上にイエロー色のトナー像が形成される。

【００１０】一方、所定タイミングで給紙された記録紙Ｐの先端が転写開始位置に達する直前に、トナーと反対の極性の所定の転写バイアス電圧が転写ドラム１２１６に印加され、イエロー色のトナー像が記録紙Ｐに転写されると同時に、記録紙Ｐが転写ドラム１２１６の表面に静電吸着される。

【００１１】次に、感光ドラム１２０１上にレーザ光Ｌの走査により第２静電潜像が形成され、マゼンタ色のトナーを有した現像器１２０３Ｍにより第２静電潜像が現像される。感光ドラム１２０１上に形成されたマゼンタ色のトナー像は、ＴＯＰＳＮＳ信号によりその画像先端が前に転写されたイエロー色のトナー像との位置合わせが行われて記録紙Ｐに転写される。

【００１２】同様にして、第３静電潜像が現像され、シアン色のトナーを有した現像器１２０３Ｃにより現像され、シアン色のトナー像が前に転写された画像との位置合わせが行われて記録紙Ｐに転写され、ついで、第４静電潜像が現像され、黒色のトナーを有した現像器１２０３Ｋにより現像され、黒色のトナー像が前に転写された画像との位置合わせが行われて記録紙Ｐに転写される。

【００１３】このように各工程毎に１ページ分のＶＤＯ信号が順次半導体レーザ１２０５に出力される。また、各転写工程毎に未転写のトナー像がクリーナ１２１０により掻き落とされる。

【００１４】その後、４色のトナー像が転写された記録紙Ｐの先端部が分離爪１２１２の位置に近づくと、分離爪１２１２が接近して、記録紙Ｐの先端が転写ドラム１２１６の表面に接触し、記録紙Ｐを転写ドラム１２１６から分離させる。分離爪１２１２の先端は記録紙Ｐの後端が転写ドラム１２１６から離れるまで転写ドラム１２１６に接触し続け、その後離れて元の位置に戻る。そして、除電器１２１１により記録紙Ｐ上の蓄積電荷が除電され、分離爪１２１２による記録紙Ｐの分離を容易にすると同時に、用紙分離時における気中放電を減少させる。

【００１５】最後に現像された画像は定着ローラ１２１３によって定着され排紙トレイ１２２９に排紙される。なお、図１９における画像形成部１２５０とは、図１８の各構成要素から半導体レーザ１２０５，スキャナモータ１２０６，ポリゴンミラー１２０７，検出器１２０２，１２１７を除く全て要素の総称である。

【００１６】図２０は、図１９に示したＴＯＰＳＮＳ信号とＶＤＯ信号の関係を示すタイミングチャートである。

【００１７】図２０において、Ａ１は第１トナー色の印刷動作，Ａ２は第２トナー色の印刷動作，Ａ３は第３トナー色の印刷動作，Ａ４は第４トナー色の印刷動作である。区間Ａ１からＡ４までが１ページのカラー印刷動作となる。

【００１８】次に、画像信号処理について説明する。

【００１９】図２１は、従来のフルカラープリンタ装置１３０２の機能構成を示すブロック図である。

【００２０】図２１において、ホストインタフェース１３０３は、外部機器、例えばホストコンピュータ１３０１からプリント情報１３０７を受信し、受信プリント情報に含まれる制御信号１３０８をプリンタ制御部１３０４へ、受信プリント情報に含まれる画像信号１３０９を画像処理部１３０５へ送る。そして、画像処理部１３０

５の出力信号で半導体レーザ１３０６を駆動する。また、プリンタ制御部１３０４は制御信号１３１０によって画像処理部１３０５を制御する。

【００２１】図２２は、図２１に示した画像処理部１３０５の詳細構成を示すブロック図である。

【００２２】図２２に示したカラー処理部１３５１は、図２１に示すホストインタフェース１３０３から１２４ビットのＲＧＢ画像信号を受信し、入力ＲＧＢ信号を所定タイミングで順次対応するＹＭＣＫ信号に変換する。すなわち、入力ＲＧＢ信号を、あるときはＹ信号、あるときはＭ信号、あるときはＣ信号、あるときはＫ信号を示す前述した８ビットのＶＤＯ信号に変換する。

【００２３】図２３は、図２２に示したカラー処理部１３５１が実行するカラー信号変換処理のタイミングチャートである。

【００２４】図２３におけるＡ１，Ａ２，Ａ３，Ａ４は、図２０で説明した印刷動作と同じ各トナー色に対する印刷動作を示す。さらに、図２３のＲ１，Ｇ１，Ｂ１は各トナー色に対する印刷動作に対して同じＲＧＢ信号が用いられることを示す。また、２ビットの色指定信号によって、各印刷動作がどの色成分の印刷を行っているかを示す。さらにまた、図２３の色指定信号の各数値にある“Ｂ”はその数値がバイナリ表現であることを示す。

【００２５】さて、カラー処理部１３５１よりのＹ，Ｍ，Ｃ，ＫのＶＤＯ信号は、図２２に示すように後段のγ補正部１３５２でγ補正され、８ビットの信号として出力され、次のパルス幅変調部（以下、ＰＷＭ部と称す）１３５３に入力される。ＰＷＭ部１３５３では、８ビットの画像信号を、画像クロック（ＶＣＬＫ）の立ち上がりに同期させてラッチ１３５４でラッチする。そして、ラッチしたデジタルデータをＤ／Ａコンバータ１３５５で対応するアナログ電圧に変換させ、アナログコンパレータ１３５６に入力する。

【００２６】一方、画像クロック（ＶＣＬＫ）は、三角波発生部１３５８にも入力され、ここで、三角波に変換されてアナログコンパレータ１３５６に入力される。アナログコンパレータ１３５６は、三角波発生部１３５８よりの三角波信号とＤ／Ａコンバータ１３５５よりのアナログ信号とを比較し、パルス幅変調された信号を出力する。このパルス幅変調された信号がインバータ１３５７で反転され、ＰＷＭ信号が図２４に示すように得られる。なお、図２４は、図２２に示すＰＷＭ部１３５３のＰＷＭ信号生成プロセスを説明するタイムチャートである。

【００２７】従って、ＰＷＭ部１３５３に入力される８ビットの画像データが最大値“ＦＦ（Ｈ）”となるとき最も幅の広いＰＷＭ信号が出力され、一方、最小値“００（Ｈ）”となるときで最も幅の狭いＰＷＭ信号が出力される。

【００２８】

【発明が解決しようとする課題】以上説明したように、プリンタ本体の機能は進化しているものの、消耗品の機能や管理方法はまだ充分であるとは言えない。

【００２９】まず、消耗品の寿命であるが、例えば感光ドラムカートリッジの寿命検出方法はドラム表面の電位を測定するなどして大雑把な寿命検出しかできなかった。そのためユーザへの警告は、プリンタ本体のディスプレイパネルにて警告ランプを点灯するなどして、寿命が充分あるか無いかの２値的な報知でしかなかった。

【００３０】次に、消耗品の管理性であるが、これまでに消耗品の個々に固有のＩＤナンバーといった考えは無く、個々の状態を識別することができないため、一度寿命となった消耗品をまたプリンタ本体に入れてしまって、プリントした後に気がつくといった煩わしいことが起きてしまう場合が発生する等の問題点があった。

【００３１】本発明は、上記の問題点を解消するためになされたもので、本発明に係る第１の発明～第１６の発明の目的は、画像形成装置に本体に対して着脱可能な各ユニットを各ユニットに記憶される属性情報に基づいて個別に識別しながら各消耗材の残量等の属性情報を更新可能に管理することにより、画像形成シーケンスの実行に伴って消耗される各ユニットを個別に識別して交換有無をユーザに明示できるとともに、その消耗材の残量等を管理して交換時期をユーザに明示できる画像形成装置および画像形成装置の消耗材管理方法を提供することである。

【００３２】

【課題を解決するための手段】本発明に係る第１の発明は、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリを備える複数のユニットを画像形成装置本体に着脱自在に構成したものである。

【００３３】本発明に係る第２の発明は、各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段と、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定手段と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知手段とを設けたものである。

【００３４】本発明に係る第３の発明は、前記判定手段が不一致と判定した場合に、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新する第１の制御手段を設けたものである。

【００３５】本発明に係る第４の発明は、前記報知手段は、交換されたユニット候補を操作パネルに表示するものである。

【００３６】本発明に係る第５の発明は、前記報知手段

は、交換されたユニット候補を外部装置に通知して外部表示するものである。

【００３７】本発明に係る第６の発明は、前記報知手段は、交換されたユニット候補を記録媒体に印刷して出力するものである。

【００３８】本発明に係る第７の発明は、いずれか１つのユニットは、像担持体に形成された潜像を現像する現像ユニットとするものである。

【００３９】本発明に係る第８の発明はいずれか１つのユニットは、像担持体に形成された潜像を色別現像する現像ユニットとするものである。

【００４０】本発明に係る第９の発明は、いずれか１つのユニットは、感光体が収納される感光体ユニットとするものである。

【００４１】本発明に係る第１０の発明は、前記属性情報は、画像形成に使用される所定の消耗材の識別情報を含むものである。

【００４２】本発明に係る第１１の発明は、前記属性情報は、画像形成に使用される所定の消耗材の寿命情報を含むものである。

【００４３】本発明に係る第１２の発明は、画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新する第２の制御手段を設けたものである。

【００４４】本発明に係る第１３の発明は、前記第２の制御手段は、前記画像形成装置本体の画像形成シーケンス毎に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新するものである。

【００４５】本発明に係る第１４の発明は、前記第２の制御手段は、前記画像形成装置本体が所定回数の画像形成シーケンス実行毎に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新するものである。

【００４６】本発明に係る第１５の発明は、前記第２の制御手段は、前記画像形成装置本体が動作可能時における画像シーケンス実行有無を判定し、該判定結果に基づいて前記第１の不揮発性メモリに記憶されている属性情報の更新を休止するものである。

【００４７】本発明に係る第１６の発明は、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリと、各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段とを備える複数のユニットを画像形成装置本体に着脱自在の構成とした画像形成装置の消耗材管理方法において、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定工程と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知工程と、前記判定手段が不一致と判定した場合に、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新する第１の更新工程と、画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新する第２の更新工程とを有するものである。

【００４８】

【発明の実施の形態】

〔第１実施形態〕以下、添付図面を参照して、本発明の好適な実施形態を詳細に説明する。

【００４９】図１は、本発明の第１実施形態を示す画像形成装置の構成を説明する断面構成図であり、例えば６００ドット／インチ（ｄｐｉ）の解像度を有し、各色成分各画素が８ビットで表現された多値データに基づいて画像記録を行うカラーレーザプリンタ（以下、ＣＬＢＰ、あるいは、プリンタという）に対応する。なお、後述する他の実施形態においても装置本体１を共通の実施形態として用いる。

【００５０】装置本体１において、給紙部１０１から給紙された転写紙Ｐはその先端をグリッパ１０３ｆにより挟持されて、転写ドラム１０３の外周に保持される。

【００５１】この時、転写紙Ｐの先端を検出器８が検出して、その検出信号によって垂直同期信号（後述）が生成される。像担持体（以下、感光ドラムという）１００に、光学ユニット１０７より各色に形成された潜像は、各色現像器Ｄｙ，Ｄｃ，Ｄｂ，Ｄｍにより現像化されて、転写ドラム外周の用紙に複数回転写されて、他色画像が形成される。その後、用紙Ｐは転写ドラム１０３より分離されて定着ユニット１０４で定着され、排紙部１０５より排紙トレイ部１０６に排出される。

【００５２】ここで各色の現像器Ｄｙ，Ｄｃ，Ｄｂ，Ｄｍは、その両端に回転支軸を有し、各々がその軸を中心に回転可能に現像器選択機構部１０８に保持される。これによって、各現像器Ｄｙ，Ｄｃ，Ｄｂ，Ｄｍは、図１に示すように、現像器選択のために現像器選択機構部１０８が回転軸１１０を中心にして回転しても、その姿勢を一定に維持できる。選択された現像器が現像位置に移動後、現像器選択機構部１０８は現像器と一体で支点１０９ｂを中心にして、選択機構保持フレーム１０９をソレノイド１０９ａにより感光ドラム１００方向へ引っ張られ、感光ドラム１００方向へ移動する。

【００５３】次に、上記構成のカラーレーザビームプリンタのカラー画像形成動作について具体的に説明する。

【００５４】まず、帯電器１１１によって感光ドラム１００が所定の極性に均一に帯電され、レーザビーム光Ｌによる露光によって感光ドラム１００上に、たとえば、Ｍ（マゼンタ）色の潜像がＭ（マゼンタ）色の現像器Ｄｍにより現像され、感光ドラム１００上にＭ（マゼンタ）色の第１のトナー像が形成される。一方、所定のタイミングで転写紙Ｐが給紙され、トナーと反対極性（た

とえばプラス極性）の転写バイアス電圧（＋１．８ｋＶ）が転写ドラム１０３に印加され、感光ドラム１００上に第１トナー像が転写紙Ｐに転写されると共に、転写紙Ｐが転写ドラム１０３の表面に静電吸着される。その後、感光ドラム１００はクリーナ１１２によって残留するＭ（マゼンタ）色トナーが除去され、次の色の潜像形成および現像工程に備える。

【００５５】次に、感光ドラム１００上にレーザビーム光ＬによりＣ（シアン）色の第２の潜像が形成され、次いでＣ（シアン）色の現像器Ｄｃにより感光体ドラム１００上の第２の潜像が現像されてＣ（シアン）色の第２のトナー像が形成される。そして、Ｃ（シアン）色の第２のトナー像は、先に転写紙Ｐに転写されたＭ（マゼンタ）色の第１のトナー像の位置に合わせて転写紙Ｐに転写される。この２色目のトナー像の転写においては、転写紙Ｐが転写部に達する直前に、転写ドラム１０３に＋２．１ｋＶバイアス電圧が印加される。

【００５６】同様にして、Ｙ（イエロー）色、Ｂｋ（ブラック）色の第３，第４の潜像が感光ドラム１００上に順次形成され、それぞれが現像器Ｄｙ，Ｄｂによって順次現像され、転写紙Ｐに先に転写されたトナー像と位置合わせされてＹ（イエロー）色，Ｂｋ（ブラック）色の第３，第４の各トナー像が順次転写される。このようにして転写紙Ｐ上に４色のトナー像が重なった状態で形成されることになる。これら３色目、４色目のトナー像の転写においては、転写紙Ｐが転写部に達する直前に転写ドラム１０３にそれぞれ＋２．５ｋＶ，＋３．０ｋＶのバイアス電圧が印加される。

【００５７】このように各色のトナー像の転写を行うごとに転写バイアス電圧を高くしていくのは、転写効率の低下を防止するためである。この転写効率の低下の主な原因は、転写紙Ｐが転写後に感光ドラム１００から離れる時に、気中放電により転写紙Ｐの表面が転写バイアス電圧と逆極性に帯電し（転写紙を担持している転写ドラム表面も若干帯電する）、この帯電電荷が転写ごとに蓄積されて転写バイアス電圧が一定であると転写ごとに転写電界が低下していくことにある。

【００５８】上記４色目の転写の際に、転写紙先端が転写開始位置に達したときに（直前直後を含む）、実効交流電圧５．５ｋＶ（周波数は５００Ｈｚ）に、第４のトナー像の転写時に印加された転写バイアスと同極性でかつ同電位の直流バイアス電圧＋３．０ｋＶを重畳させて帯電器１１１に印加する。このように４色目の転写の際に、転写紙先端が転写開始位置に達したときに帯電器１１１を動作させるのは転写ムラを防止するためである。

【００５９】特に、フルカラー画像の転写においては、僅かな転写ムラが発生しても色の違いとして目立ちやすいので、上述したように帯電器１１１に所要のバイアス電圧を印加して放電動作を行わせることが必要となる。この後、４色のトナー像が重畳転写された転写紙Ｐの先端部が分離位置に近づくと、分離爪１１３が接近してその先端が転写ドラム１０３の表面に接触し、転写紙Ｐを転写ドラム１０３から分離させる。分離爪１１３の先端は転写ドラム表面との接触状態を保ち、その後転写ドラム１０３から離れて元の位置に戻る。帯電器１１１は、上記のように転写紙の先端が最終色（第４色目）の転写開始位置に達したときから転写紙後端が転写ドラム１０３を離れるまで作動して転写紙上の蓄積電荷（トナーと反対極性）を除電し、分離爪１１３による転写紙Ｐの分離を容易にすると共に、分離時の気中放電を減少させる。なお、転写紙Ｐの後端が転写終了位置（感光ドラム１００と転写ドラム１０３とが形成するニップ部の出口）に達したときに、転写ドラム１０３に印加する転写バイアス電圧をオフ（接地電位）にする。



【００６０】これと同時に、帯電器１１１に印加していたバイアス電圧をオフにする。次に、分離された転写紙Ｐは定着器（ユニット）１０４に搬送され、ここで転写紙上のトナー像が定着されて排紙トレイ１０６上に排出される。

【００６１】次に、レーザビーム走査による画像形成の動作を説明する。

【００６２】図１において、１０７は光学ユニットであり、検出器９，半導体レーザ１２０，ポリゴンミラー１２１，スキャナモータ１２２，レンズ１２３，ミラー１２５により構成されている。転写紙Ｐが給紙され、その先端が転写ドラム１０３に搬送されてきたら、それに同期して１ページ分に画像信号ＶＤＯが半導体レーザ１２０へと出力され、画像信号ＶＤＯにより変調された光ビームＬがスキャナモータ１２２により回転されるポリゴンミラー１２１に向けて射出され、その射出された光ビームＬはレンズ１２３，ミラー１２５により感光ドラム１００に導かれる。

【００６３】また、光ビームＬが射出されると主走査軸上に配置された検出器９により光ビームＬが検出され、水平同期信号となるＢＤ（ビーム検出）信号が出力される。その結果、光ビームＬによりＢＤ信号に同期して感光ドラム１００が走査露光され、静電潜像が形成される。

【００６４】本実施形態のカラーレーザビームプリンタは、以上のような画像形成過程を経て６００ドット／インチ（ｄｐｉ）の解像度で画像出力を行う。

【００６５】この装置の入力データとしては、ホストコンピュータ（以下、ホストという）で生成するカラー画像データ（たとえば、ＲＧＢ成分で表現されるデータ）や、他の画像データ生成装置（スチル画像レコーダなど）で生成し何かの記憶媒体に格納した画像データなどが考えられる。このため、この装置には、図１に示すように、ホストからの画像情報を受信して画像データを生成するプリンタコントローラ２とその画像データを処理する信号処理部４が設けられている。

【００６６】以下に示すいくつかの実施形態ではホストから送られてくるカラー画像データを入力データとして考える。

【００６７】図２は、図１に示したプリンタ１の機能構成を示すブロック図である。

【００６８】図２において、プリンタ１はホストコンピュータ（以下、ホストという）１０００，１００１から送られてくる所定の記述言語の画像情報をネットワーク５を介して受信して展開し、これを各色成分が８ビット（Ｄ０～Ｄ７）で構成されるＹＭＣＢｋ画像信号６として出力するプリンタコントローラ２とプリンタエンジン３とで構成される。あるいは、ホスト１０００，１００１はイメージリーダ等で読み込んだＲＧＢ等のビットデータを画像情報５として送出することもあり、この場合にはプリンタコントローラ２はこれを解釈することなく処理する。

【００６９】プリンタコントローラ２とプリンタエンジン３との間には、画像信号６以外にも種々の画像信号がシリアル通信１５の形で授受される。これらの画像信号には、プリンタエンジン３からプリンタコントローラ２に送出するページ（副走査方向）同期信号（ＰＳＹＮＣ），主走査方向の同期信号（ＬＳＹＮＣ），プリンタコントローラ２からプリンタエンジン３に送出する１ビットの属性指定信号（ＰＨＩＭＧ），データ転送用クロック（ＶＣＬＫ）がある。

【００７０】ここで、属性指定信号（ＰＨＩＭＧ）とはプリンタから出力される画像のライン密度を指定する信号であり、ＰＨＩＭＧ＝“Ｈ”のとき、３００ｄｐｉを、ＰＨＩＭＧ＝“Ｌ”のとき、６００ｄｐｉを示す。

【００７１】プリンタコントローラ２は、画像信号６を各色成分の８ビットの信号を、１ビットの属性指定信号（ＰＨＩＭＧ）とともに、データ転送用クロック（ＶＣＬＫ）に同期して出力する。２０８はディスプレイで、プリントコントローラ２より受信する消耗材の使用状態等の各種情報を表示する。また、ディスプレイ２０８はタッチパネルで構成され、ユーザがプリンタ１に対する各種設定を入力できるようにしてもよい。

【００７２】図３は、図２に示したプリンタエンジン３の機能構成を示すブロック図である。

【００７３】図３において、光学ユニット１０７に含まれる基準発振器１０からの基準クロックは分周器１１により分周され、分周クロックとスキャナモータ１２２からのフィードバック信号との位相差を所定位相差とするようにスキャナモータ１２２がモータ制御回路１２（図示しない公知の位相制御回路を内蔵）により等速回転される。そして、スキャナモータ１２２の回転がポリゴンミラー１２１に伝達され、ポリゴンミラー１２１を等速回転させる。

【００７４】一方、転写ドラム１０３が駆動モータ（不図示）により等速回転され、転写ドラム１０３上の記録紙Ｐの先端が検出器８により検出され、垂直同期信号（ＶＳＹＮＣ）が信号処理部４に出力される。そして、垂直同期信号（ＶＳＹＮＣ）により、各色の画像先端が規定される。垂直同期信号（ＶＳＹＮＣ）が出力された後、検出器９によって生成されるＢＤ信号を水平同期信号（ＨＳＹＮＣ）として、ＢＤ信号に同期して、画像信号（ＶＤＯ）が順次、半導体レーザ１２０に送出される。

【００７５】また、信号処理部４が内蔵するＣＰＵ１４はプリンタコントローラ２とシリアル通信を行って、制御信号を交換し、プリンタコントローラ２とプリンタエンジン３の動作を同期させる。またＣＰＵ１４は、現像器メモリ２０３～２０６と感光ドラムメモリ２０７と、バックアップメモリ２３０をシリアル通信ライン２０２を介して通信を行っている。前記現像器メモリ２０３～２０６は、各色の現像器に取り付けてあるＥＥＰＲＯＭであり、感光ドラムメモリ２０７は感光ドラムカートリッジに取り付けてあるＥＥＰＲＯＭである。

【００７６】画像形成プロセスにおける上述の垂直同期信号（ＶＳＹＮＣ），水平同期信号（ＢＤ），および画像信号（ＶＤＯ）のタイミングは図４に示すようになる。なお、図４は、図２，図３の動作を説明するタイミングチャートである。

【００７７】以下、本実施形態と第１～第１５の発明の各手段との対応及びその作用について図３等を参照して説明する。

【００７８】第１の発明は、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリ（本実施形態では、例えばＥＥＰＲＯＭで構成される現像器メモリ２０３～２０６，感光ドラムメモリ２０７）を備える複数のユニットを画像形成装置本体に着脱自在に構成したので、各ユニットを識別して使用状態を認識することができる。

【００７９】第２の発明は、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリ（本実施形態では、例えばＥＥＰＲＯＭで構成される現像器メモリ２０３～２０６，感光ドラムメモリ２０７）を備える複数のユニットを画像形成装置本体に着脱自在に構成し、かつ各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段（バックアップメモリ２３０）と、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定手段（ＣＰＵ１４が図示しないＲＯＭまたは他のメモリ資源に記憶される制御プログラムを実行して判定処理する）と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知手段（ＣＰＵ１４が図示しないＲＯＭまたは他のメモリ資源に記憶される制御プログラムを実行して報知処

理する）とを有し、ＣＰＵ１４がバックアップメモリ２３０に記憶される各属性情報と現像器メモリ２０３～２０６，感光ドラムメモリ２０７に記憶される各属性情報を読み出して不一致と判定した場合に、交換されたユニット候補を報知するので、各ユニットの交換有無を確実に認識してユーザに明示することができる。

【００８０】第３の発明は、ＣＰＵ１４が不一致と判定した場合に、交換された現像器メモリ２０３～２０６，感光ドラムメモリ２０７のいずれかに記憶されている属性情報を読み出してバックアップメモリ２３０の属性情報を更新するので、各ユニットの交換後、継続して各ユニットを識別して使用状態を管理することができる。

【００８１】第４の発明は、ＣＰＵ１４は、交換されたユニット候補を操作パネル（図２に示したディスプレイ２０８）に表示するので、画像処理装置本体側で作業するユーザに交換されたユニットを識別して明示できる。

【００８２】第５の発明は、ＣＰＵ１４は、交換されたユニット候補を外部装置（ホストコンピュータ１０００）に通知して外部表示（モニタ１０００Ａ）するので、画像処理装置本体から遠隔した外部側で作業するユーザに交換されたユニットを識別して明示できる。

【００８３】第６の発明は、ＣＰＵ１４は、交換されたユニット候補を記録媒体に印刷して出力するので、ユーザが各ユニットの交換履歴を事後確認することができる。

【００８４】第７の発明は、いずれか１つのユニットは、像担持体に形成された潜像を現像する現像ユニットとするので、現像ユニットの交換有無を確実に認識してユーザに明示することができる。

【００８５】第８の発明はいずれか１つのユニットは、像担持体に形成された潜像を色別現像する現像ユニットとするので、各色別の現像ユニットの交換有無を確実に認識してユーザに明示することができる。

【００８６】第９の発明は、いずれか１つのユニットは、感光体が収納される感光体ユニットとするので、感光体ユニットの交換有無を確実に認識してユーザに明示することができる。

【００８７】第１０の発明は、前記属性情報は、画像形成に使用される所定の消耗材の識別情報を含むので、各ユニットの消耗材を識別してそれぞれの使用状態を認識することができる。

【００８８】第１１の発明は、前記属性情報は、画像形成に使用される所定の消耗材の寿命情報を含むので、ユーザに対して各ユニットの消耗材の交換時期を適時に通知することができる。

【００８９】第１２の発明は、画像形成装置本体の画像形成シーケンス状態に基づいてＣＰＵ１４がバックアップメモリ２３０に記憶されている属性情報を更新するので、使用状態に応じて各ユニット内から消費される消耗材残量を管理して交換時期を特定することができる。

【００９０】第１３の発明は、ＣＰＵ１４は、前記画像形成装置本体の画像形成シーケンス毎に基づいて現像器メモリ２０３～２０６，感光ドラムメモリ２０７に記憶されている属性情報を更新するので、画像形成シーケンス毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量をリアルタイムに管理することができる。

【００９１】第１４の発明は、ＣＰＵ１４は、前記画像形成装置本体が所定回数の画像形成シーケンス実行毎に基づいて現像器メモリ２０３～２０６，感光ドラムメモリ２０７に記憶されている属性情報を更新するので、メモリアクセス回数に制限のある記憶媒体であっても所定回数の画像形成シーケンス実行毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量をメモリ寿命内で確実に管理することができる。

【００９２】第１５の発明は、ＣＰＵ１４は、前記画像形成装置本体が動作可能時における画像シーケンス実行有無を判定し、該判定結果に基づいて現像器メモリ２０３～２０６，感光ドラムメモリ２０７に記憶されている属性情報の更新を休止するので、メモリアクセス回数に制限のある記憶媒体であっても、所定回数の画像形成シーケンスが実行されない場合には不要なメモリアクセスが制限されるため、各ユニット内から消費される最新の消耗材残量をメモリ寿命内で確実に管理することができる。

【００９３】図５は、図３に示した信号処理部４の構成を示すブロック図であり、本実施形態における信号処理部４は、ラインメモリ２０、そして、ＰＷＭによる中間調処理部に大別される。

【００９４】ラインメモリ２０は、プリンタコントローラ２から送出される多値画像データ（Ｄ０～Ｄ７）と属性指定信号（ＰＨＩＭＧ）をデータ転送用クロック（ＶＣＬＫ）にて格納した後、プリンタエンジン３の画像クロック（ＰＣＬＫ）により読み出す動作をする。

【００９５】また、ＰＷＭによる中間調処理部，γ補正部２１，Ｄ／Ａ変換部２２，コンパレータ２３，２４，三角波発生部２６，２７、そしてセレクタ２８にて構成される。そして、ラインメモリ２０からの多値画像データは、γ補正部２１にてγ補正され、Ｄ／Ａ変換部２２にてアナログ信号に変換された後、コンパレータ２３，２４の正入力端子（＋）に入力される。他方、コンパレータ２３，２４の負入力端子（－）には、画像クロック（ＰＣＬＫ）とそれを分周した１／２ＰＣＬＫのクロックに基づいて三角波信号を発生する三角波発生部２６，２７の出力信号が入力される。

【００９６】そして、各々のコンパレータ２３，２４は、これら２信号を比較して、多値画像信号に応じてパルス幅の信号を生成する。コンパレータ２３から解像度が６００ｄｐｉの画像を形成するためのＰＷＭ信号が、一方、コンパレータ２４からは解像度が３００ｄｐｉの

画像を形成するためのＰＷＭ信号が出力される。これら２つのコンパレータ２３，２４の出力信号は、セレクタ２８に入力される。

【００９７】セレクタ２８は入力される属性指定信号（ＰＨＩＭＧ）に従って、ＰＨＩＭＧ＝“Ｈ”のとき、コンパレータ２４からのＰＷＭ信号（解像度３００ｄｐｉの画像形成に使用）を選択し、一方、ＰＨＩＭＧ＝“Ｌ”のとき、コンパレータ２３からのＰＷＭ信号（解像度６００ｄｐｉの画像形成に使用）を選択して、画像信号（ＶＤＯ）としてレーザ駆動部１２０へ送出する。

【００９８】図６は、図３に示した信号処理部４の信号処理タイミングを説明するタイミングチャートであり、スクリーン角なしの場合のＰＷＭ信号生成プロセスに関連する各種制御信号のタイミングチャートに対応する。

【００９９】以下、図７～図９を参照して図３に示した各メモリ２０３～２０７とＣＰＵ１４間のシリアル通信ライン２０２の構成を説明する。

【０１００】図７は、図３に示した信号処理部４でのインタフェース回路の構成を説明するブロック図である。

【０１０１】図において、２１１，２１２，２１３はデジタルトランジスタである。２１０はＰＮＰ型パワートランジスタであり、ＣＰＵ１４のポートＰＯから“ＬＯＷ”が出力された場合に、信号群２０２のＶＣＣラインに電源を供給する。ＣＰＵ１４はユーザがプリンタ１の図示しないドアを開けたことを検知したらポートＰＯを“Ｈｉｇｈ”として、各メモリに供給しているＶＣＣを開放し、電力を切る。信号群２０２のＶＣＣは、図８に示すＥＥＰＲＯＭで構成されるマゼンタ現像器メモリ２０３に供給する電源、ＣＳはチップセレクト信号、ＳＣＫはシリアル通信用のクロック信号、ＤＩはＥＥＰＲＯＭへの入力データ、ＤＯはＥＥＰＲＯＭからの出力信号を表す。

【０１０２】以上の信号のうち、ＶＣＣ，ＳＣＫ，ＤＩ，ＤＯ，ＧＮＤは各メモリ共通バスとなっており、ＣＳは各メモリ２０３～２０７にそれぞれ独立した信号ライン（ＣＰＵ１４のポートＰ１～ポートＰ５から出力）とし、信号処理部４にあるバックアップメモリ２３０のＣＳ信号は、ＣＰＵ１４のポートＰ６から出力する。

【０１０３】図８は、図３に示したマゼンタ現像器メモリ２０３の周辺回路例を説明するブロック図であり、図７と同一のものには同一の符号を付してある。なお、当該回路は、電気基板で構成されており、図９に示すように現像カートリッジ（現像器）に組み込まれている。

【０１０４】図８において、２２０はデジタルトランジスタ、２１７～２１９，２２１～２２３は抵抗、２２４～２２６はコンデンサである。

【０１０５】この回路構成は、シアン現像器メモリ，イエロー現像器メモリ，ブラック現像器メモリ，感光ドラムメモリのいずれにも共通化している。

【０１０６】図９は、図１に示したプリンタ１に装着可能なマゼンタ現像器の構成を説明する平面図である。

【０１０７】図において、２２７は現像器本体、２２８はメモリ回路基板、２０３はＥＥＰＲＯＭ、２２９はコネクタである。コネクタ２２９によって信号処理部４にあるＣＰＵ１４とＥＥＰＲＯＭ２０３との信号が接続されるのである。

【０１０８】図１０は、図９に示した現像器２２７のＥＥＰＲＯＭ２０３に対するデータ読み込み／データ書き込みタイミングを説明するためのタイミングチャートを示す図である。

【０１０９】このＥＥＰＲＯＭ２０３へのデータの入出力は、シリアル通信によって行われる。そのシリアル通信のデータ構造は、スタート「１」ビット、命令の内容を表すオペコード「２」ビット、アドレス及びデータで構成される。

【０１１０】同図（ａ）は、読み込み時を示し、まずメイン制御ＣＰＵ１４からクロックＳＣＫに同期してスタート，オペコード及びアドレスを送出すると、シリアルデータ出力端子ＤＯよりデータがクロックＳＣＫに同期して出力される。同図（ｂ）は、書き込み時を示し，メイン制御ＣＰＵ１４からクロックＳＣＫに同期して送出されるスタート，オペコード，アドレスおよびデータがシリアルデータ入力端子ＤＩより書き込まれる。

【０１１１】次に、各メモリ（上記メモリ２０３～２０６，２０７）に格納される内容について説明する。

【０１１２】各現像器メモリ２０３～２０６には、色情報（マゼンタ，シアン，イエロー，ブラックのいずれかを指定），再利用回数，製造メーカ名，ＩＤナンバ（その現像器の固有ナンバ），予想する残り寿命を格納する。このうち、色情報と製造メーカ名とＩＤナンバは、製造時に格納される情報である。再利用回数は、トナー詰め替え可能な現像器の場合、詰め替え工場にてメモリ内容を更新する。また、予想する残り寿命は、その現像器を使用したプリント枚数から予想するもので、プリント毎に更新される情報である。

【０１１３】一方、感光ドラムメモリ２０７には、製造メーカ名，製造日，ＩＤナンバ（その感光ドラムの固有ナンバ），予想する残り寿命を格納する。このうち、製造メーカ名と製造日とＩＤナンバは、製造時の格納される情報である。また、予想する残り寿命は、その現像器を使用したプリント枚数から予想するもので、プリント毎に更新される情報である。

【０１１４】図１１は、図３に示した各色別の現像器メモリ２０３～２０６のメモリマップを示す図であり、図１２は、図３に示した感光ドラムメモリ２０７のメモリマップを示す図である。

【０１１５】図１３は、本発明の第１実施形態を示す画像形成装置の消耗材管理処理手順の一例を示すフローチャートである。なお、（１）～（７）は各ステップを示し、本プリンタの電源投入から電源ＯＦＦまでの期間

の、メモリアクセスに着目した処理に対応し、具体的にはＣＰＵ１４が図示しないＲＯＭまたは他のメモリ資源に記憶された制御プログラムを実行して処理する。

【０１１６】まず、プリンタ１の電源がＯＮされると、最初に、以前の状態を記憶してあるバックアップメモリ２３０の内容と各現像器メモリ２０３～２０６の内容を比較して一致するかどうかを判断するとともに、バックアップメモリ２３０の内容と感光ドラムメモリ２０７の内容を比較して一致するかどうかを判断し（１）、それぞれ比較した結果が一致していたと判断した場合には、各色別の現像器と感光ドラムは以前のものと同一であると判断し、ステップ（４）に進む。

【０１１７】一方、ステップ（１）で不一致であると判断した場合は、一致していない内容からどの消耗品（各色別の現像器，感光ドラム）が交換されたのかを各メモリ（ＥＥＰＲＯＭ）の読み出し可能情報とバックアップメモリ２３０との照合により判断して、バックアップメモリ２３０の内容を更新するとともに（２）、同時にユーザに報知、例えば図２に示したディスプレイ２０８またはホストコンピュータ１０００等に表示し、あるはプリントアウトして報知する（３）。

【０１１８】具体的に比較する内容は、図１１に示した製造メーカ名とＩＤナンバーと、図１２に示した製造メーカ名とＩＤナンバーである。なお、報知の方法については、後で述べる。

【０１１９】次に、プリントが行われたことを監視してプリントが行われる度に（４）、各現像器メモリ２０３～２０６と感光ドラムメモリ２０７の内容を更新する（５）。具体的な更新内容としては、例えば、各色別の現像器と感光ドラムのプリント寿命枚数を、製造時に各現像器メモリ２０３～２０６と感光ドラムメモリ２０７に書き込み、１枚プリントする度にダウンカウントしていく、また、フロントドア（図示しない）が開かれたことを図示しないドアセンサを介して常に監視して、開かれたことを検出したら（６）、ステップ（１）へ戻り同様の処理を繰り返す。

【０１２０】そして、プリンタ１の電源がＯＦＦされるまでは（７）、ステップ（４）へ戻り、同様の処理を繰り返し、プリンタ１の電源がＯＦＦされたら、一連のシーケンスを終了する。

【０１２１】次に、報知の方法について説明する。大きく分けて、以下の３方法（Ａ）～（Ｃ）がある。

【０１２２】（Ａ）シリアル通信１５を介してプリンタコントローラ２に情報を送り、そこからネットワーク５を通じてユーザ端末であるホストコンピュータ１０００，１００１のモニタにて表示する。

【０１２３】（Ｂ）シリアル通信１５を介してプリンタコントローラ２に情報を送り、そこからプリンタ１のディスプレイパネル２０８に情報を送り表示する。

【０１２４】（Ｃ）該情報を印刷してプリントアウトする。または、パワーオンページにて、該情報をプリントアウトする。

【０１２５】図１４～図１６は、本発明に係る画像形成装置における消耗材管理レポート通知例を示す図であり、図１４は、上記（Ａ）の報知方法に対応し、コンピュータ１０００のモニタ１０００Ａに管理レポートＲＥＰＯＲＴ１として表示した例に対応し、図１５は、上記（Ｂ）の報知方法に対応し、図２に示したディスプレイ２０８に管理レポートＲＥＰＯＲＴ２として表示した例に対応し、図１６は、（Ｃ）の報知方法に対応し、プリンタエンジン３から管理レポートＲＥＰＯＲＴ３としてプリントアウトした例を示す。

【０１２６】これにより、図１４に示すようにユーザ端末に報知することで、複数の端末で共通のプリンタを使用している場合にプリンタと物理的に離れた場所の端末でもプリンタの消耗品の状態を知ることが可能となる。なお、この報知は消耗品が変換された時だけでなくユーザが知りたい時に消耗品情報を端末で見られるようにしてもよい。

【０１２７】また、図１５に示すようにプリンタのディスプレイパネル２０８に表示すると、消耗品を交換したその場で、交換者が消耗品状態を確認することができるのである。たとえば、中古の現像器と交換した場合には、その残寿命が、ディスプレイパネル２０８で認知できる。

【０１２８】さらに、図１６に示すように情報をプリントアウトしておけば、履歴として残る。

【０１２９】なお、本実施形態では、メモリ２０３～２０７をＥＥＰＲＯＭで構成する場合について説明したが、他の不揮発性メモリでもよい。例えば、図１１に示した色情報，製造メーカ名，ＩＤナンバ等の読み出し専用の情報だけでよい場合には紫外線消去タイプのＲＯＭでもよい。

【０１３０】また、ＣＰＵとＥＥＰＲＯＭがワンチップ化されたＥＥＰＲＯＭ内蔵型ＣＰＵを消耗品に載せてもよい。この場合、信号処理部４のＣＰＵ１４との通信がより簡素化できる。

【０１３１】さらに、プリンタ本体側にセンサを設けて、消耗品側に、磁気テープバーコードといった情報保持体を取り付けるといった方法でもよい。

【０１３２】また、残寿命の算出方法については、単なるプリント枚数のカウントに加えて、従来の光学センサや電位センサを組み合わせてより正確な検出を行い、その結果を消耗品のメモリに書き加えてもよい。

【０１３３】〔第２実施形態〕図１７は、本発明の第２実施形態を示す画像形成装置の消耗材管理処理手順の一例を示すフローチャートである。なお、（１）～（９）は各ステップを示し、プリンタ１の電源投入時からＯＦＦ時までの期間のメモリアクセスに着目した処理に対応する。

【０１３４】先ず、プリンタ１の電源がＯＮされると（１）、信号処理部４のＣＰＵ１４の中のプリント枚数をカウントするレジスタをリセットし、プリント動作を行う度にそのレジスタをインクリメントしていく（２）。そして、前記レジスタ値が１０枚を示したかどうかを判定し（４）、ＹＥＳならばＣＰＵ１４は、各現像器メモリ２０３～２０６と感光ドラムメモリ２０７の残寿命を読み取り、その値から「１０」だけデクリメントした値にメモリ２０３～２０７の内容を書き換え（３）、ステップ（１）へ戻る。

【０１３５】一方、ステップ（４）でレジスタ値が１０枚を示していないと判断した場合には、次にＣＰＵ１４は各現像器メモリ２０３～２０６と感光ドラムメモリ２０７の残寿命を監視して、所定の残寿命、例えば「１００」枚と「５０」枚と「１０」枚と「０」枚となったかどうかを判断し（５）、Ｙｅｓの場合はユーザに報知し（６）、ステップ（１）の処理に戻る。なお、ユーザへの報知方法については、第１実施形態と同様とする。

【０１３６】一方、ステップ（５）でＮｏの場合は、ステップ（７）へ進む。次いで、プリンタ１の電源がＯＦＦされたかどうかを判断し（７）、ＮＯならばステップ（１）に戻り、同様のシーケンスを繰り返す。

【０１３７】一方、ステップ（７）で、電源がＯＦＦされたと判断した場合には、ＣＰＵ１４のプリント枚数レジスタの値が「０」であるかどうかを判断し（８）、ＹＥＳ、すなわち、１枚もプリントを行わなかった場合には、そのまま処理を終了する。

【０１３８】一方、ステップ（８）でＣＰＵ１４のプリント枚数レジスタが「１」以上であると判断した場合には、その枚数分だけ、各現像器メモリ２０３～２０６と感光ドラムメモリ２０７の残寿命内容の書き換えを行った後に（９）、本シーケンスを終了する。

【０１３９】以下、本実施形態と第１６の発明の各工程との対応及びその作用について図１３，図１７等を参照して説明する。

【０１４０】第１６の発明は、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する第１の不揮発性メモリ（現像器メモリ２０３～２０６，感光ドラムメモリ２０７）と、各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して記憶する第２の不揮発性記憶手段（バックアップメモリ２３０）とを備える複数のユニットを画像形成装置本体に着脱自在の構成とした画像形成装置の消耗材管理方法において、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定する判定工程（図１３のステップ（１））と、前記判定手段が不一致と判定した場合に、交換されたユニット候補を報知する報知工程（図１３のステップ（３））と、前記判定手段が不一致と判定した場合に、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新する第１の更新工程（図１３のステップ（２））と、画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新する第２の更新工程（図１３のステップ（５），図１７のステップ（１）～（９））とを図３に示したＣＰＵ１４が図示しないＲＯＭまたは他のメモリ資源に記憶される制御プログラムを実行して、画像形成シーケンス実行毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量を管理することができる。

【０１４１】以上の説明は、フルカラープリントの場合、つまりすべての色の現像器を使用した場合についてのものである。たとえば、黒単色のプリントモードの場合は、ブラック現像器メモリ２０６と感光ドラムメモリ２０７の内容だけ更新すればよいのである。

【０１４２】以上説明したように、本実施形態では、各現像器メモリ２０３～２０６や感光ドラムメモリ２０７の書き換え回数を減らすことで、次の２つの効果が考えられる。１つ目は、メモリデバイス自身の書き換え回数の寿命に対して、充分にマージンをもてることである。例えば、ＥＥＰＲＯＭの書き込み回数は１０万回以下となっている。これに対して、感光ドラム寿命は約２万枚である。本実施形態によれば、感光ドラムメモリ２０７の書き換えは２千回となり、ＥＥＰＲＯＭの寿命の１／５０で使用することになり、充分のマージンをもてる。

【０１４３】２つ目は、メモリ内容を破壊する確率を充分に下げられるということである。メモリ内容の破損は、主に書き込み動作中に発生する。この確率は、極めて低いが、この書き込み回数を減らすことで、さらに信頼を高めることができる。

【０１４４】なお、本発明は、複数の機器から構成されるシステムに適用しても、１つの機器からなる装置に適用してもよい。また、本発明は、システムあるいは装置にプログラムを供給することによって達成される場合にも適用できることは言うまでもない。この場合、本発明を達成するためのソフトウエアによって表されるプログラムを格納した記憶媒体を該システムあるいは装置に読み出すことによって、そのシステムあるいは装置が、本発明の効果を享受することが可能となる。

【０１４５】さらに、本発明を達成するためのソフトウエアによって表されるプログラムをネットワーク上のデータベースから通信プログラムによりダウンロードして読み出すことによって、そのシステムあるいは装置が、本発明の効果を享受することが可能となる。

【０１４６】

【発明の効果】以上説明したように、本発明に係る第１の発明によれば、画像形成に使用される所定の消耗材およびその使用状態を認識するための属性情報を記憶する

第１の不揮発性メモリを備える複数のユニットを画像形成装置本体に着脱自在に構成したので、各ユニットを識別して使用状態を認識することができる。

【０１４７】第２の発明によれば、判定手段が前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して不一致と判定した場合に、報知手段が交換されたユニット候補を報知するので、各ユニットの交換有無を確実に認識してユーザに明示することができる。

【０１４８】第３の発明によれば、前記判定手段が不一致と判定した場合に、第１の制御手段が交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新するので、各ユニットの交換後、継続して各ユニットを識別して使用状態を管理することができる。

【０１４９】第４の発明によれば、前記報知手段は、交換されたユニット候補を操作パネルに表示するので、画像処理装置本体側で作業するユーザに交換されたユニットを識別して明示できる。

【０１５０】第５の発明によれば、前記報知手段は、交換されたユニット候補を外部装置に通知して外部表示するので、画像処理装置本体から遠隔した外部側で作業するユーザに交換されたユニットを識別して明示できる。

【０１５１】第６の発明によれば、前記報知手段は、交換されたユニット候補を記録媒体に印刷して出力するので、ユーザが各ユニットの交換履歴を事後確認することができる。

【０１５２】第７の発明によれば、いずれか１つのユニットは、像担持体に形成された潜像を現像する現像ユニットとするので、現像ユニットの交換有無を確実に認識してユーザに明示することができる。

【０１５３】第８の発明によれば、いずれか１つのユニットは、像担持体に形成された潜像を色別現像する現像ユニットとするので、各色別の現像ユニットの交換有無を確実に認識してユーザに明示することができる。

【０１５４】第９の発明によれば、いずれか１つのユニットは、感光体が収納される感光体ユニットとするので、感光体ユニットの交換有無を確実に認識してユーザに明示することができる。

【０１５５】第１０の発明によれば、前記属性情報は、画像形成に使用される所定の消耗材の識別情報を含むので、各ユニットの消耗材を識別してそれぞれの使用状態を認識することができる。

【０１５６】第１１の発明によれば、前記属性情報は、画像形成に使用される所定の消耗材の寿命情報を含むので、ユーザに対して各ユニットの消耗材の交換時期を適時に通知することができる。

【０１５７】第１２の発明によれば、画像形成装置本体の画像形成シーケンス状態に基づいて第２の制御手段が前記第１の不揮発性メモリに記憶されている属性情報を更新するので、使用状態に応じて各ユニット内から消費される消耗材残量を管理して交換時期を特定することができる。

【０１５８】第１３の発明によれば、前記第２の制御手段は、前記画像形成装置本体の画像形成シーケンス毎に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新するので、画像形成シーケンス毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量をリアルタイムに管理することができる。

【０１５９】第１４の発明によれば、前記第２の制御手段は、前記画像形成装置本体が所定回数の画像形成シーケンス実行毎に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新するので、メモリアクセス回数に制限のある記憶媒体であっても所定回数の画像形成シーケンス実行毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量をメモリ寿命内で確実に管理することができる。

【０１６０】第１５の発明によれば、前記第２の制御手段は、前記画像形成装置本体が動作可能時における画像シーケンス実行有無を判定し、該判定結果に基づいて前記第１の不揮発性メモリに記憶されている属性情報の更新を休止するので、メモリアクセス回数に制限のある記憶媒体であっても、所定回数の画像形成シーケンス実行されない場合には不要なメモリアクセスが制限されるため、各ユニット内から消費される最新の消耗材残量をメモリ寿命内で確実に管理することができる。

【０１６１】第１６の発明によれば、前記第２の不揮発性記憶手段に記憶される各属性情報と各ユニットの第１の不揮発性メモリに記憶される各属性情報を読み出して一致するかどうかを照合判定し、不一致と判定した場合に、交換されたユニット候補を報知するとともに、交換されたユニットの第１の不揮発性メモリに記憶されている属性情報を読み出して前記第２の不揮発性記憶手段の属性情報を更新し、さらに、画像形成装置本体の画像形成シーケンス状態に基づいて前記第１の不揮発性メモリに記憶されている属性情報を更新するので、各ユニットを識別して使用状態を認識することができるとともに、画像形成シーケンス実行毎の使用状態に応じて各ユニット内から消費される最新の消耗材残量を管理することができる。

【０１６２】従って、画像形成シーケンスの実行に伴って消耗される各ユニットを個別に識別して交換有無をユーザに明示できるとともに、その消耗材の残量等を管理して交換時期をユーザに明示できる等の効果を奏する。

【図面の簡単な説明】

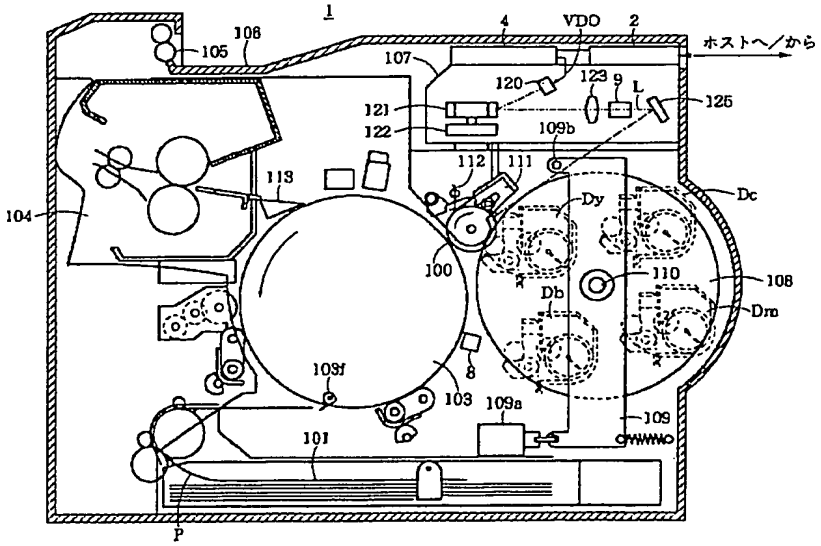
【図１】本発明の第１実施形態を示す画像形成装置の構成を説明する断面構成図である。

【図２】図１に示したプリンタの機能構成を示すブロック図である。

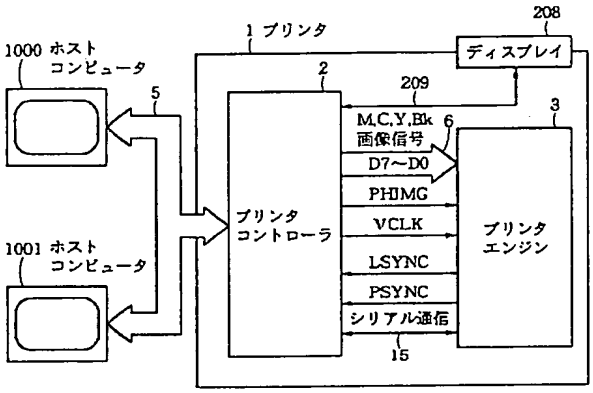
【図３】図２に示したプリンタエンジンの機能構成を示

すブロック図である。
【図４】図２，図３の動作を説明するタイミングチャートである。
【図５】図３に示した信号処理部の構成を示すブロック図である。
【図６】図３に示した信号処理部の信号処理タイミングを説明するタイミングチャートである。
【図７】図３に示した信号処理部でのインタフェース回路の構成を説明するブロック図である。
【図８】図３に示したマゼンタ現像器メモリの周辺回路例を説明するブロック図である。
【図９】図１に示したプリンタに装着可能なマゼンタ現像器の構成を説明する平面図である。
【図１０】図９に示した現像器のＥＥＰＲＯＭに対するデータ読み込み／データ書き込みタイミングを説明するためのタイミングチャートを示す図である。
【図１１】図３に示した各色別の現像器メモリのメモリマップを示す図である。
【図１２】図３に示した感光ドラムメモリのメモリマップを示す図である。
【図１３】本発明の第１実施形態を示す画像形成装置の消耗材管理処理手順の一例を示すフローチャートである。
【図１４】本発明に係る画像形成装置における消耗材管理レポート通知例を示す図である。
【図１５】本発明に係る画像形成装置における消耗材管理レポート通知例を示す図である。
＊【図１６】本発明に係る画像形成装置における消耗材管理レポート通知例を示す図である。
【図１７】本発明の第２実施形態を示す画像形成装置の消耗材管理処理手順の一例を示すフローチャートである。
【図１８】従来のフルカラープリンタ装置の構成を示す断面図である。
【図１９】図１８に示すフルカラープリンタ装置の制御構成を説明するブロック図である。
【図２０】図１９に示したＴＯＰＳＮＳ信号とＶＤＯ信号の関係を示すタイミングチャートである。
【図２１】従来のフルカラープリンタ装置の機能構成を示すブロック図である。
【図２２】図２１に示した画像処理部の詳細構成を示すブロック図である。
【図２３】図２２に示したカラー処理部が実行するカラー信号変換処理のタイミングチャートである。
【図２４】図２２に示すＰＷＭ部のＰＷＭ信号生成プロセスを説明するタイムチャートである。
【符号の説明】
４　信号処理部
２０３　現像器メモリ
２０４　現像器メモリ
２０５　現像器メモリ
２０６　現像器メモリ
２０７　感光ドラムメモリ
２３０　バックアップメモリ

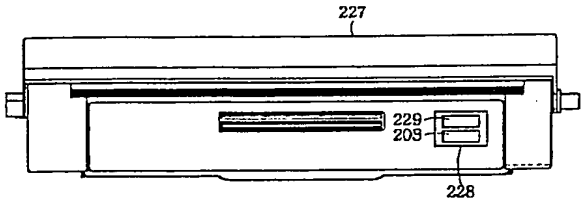
【図１】



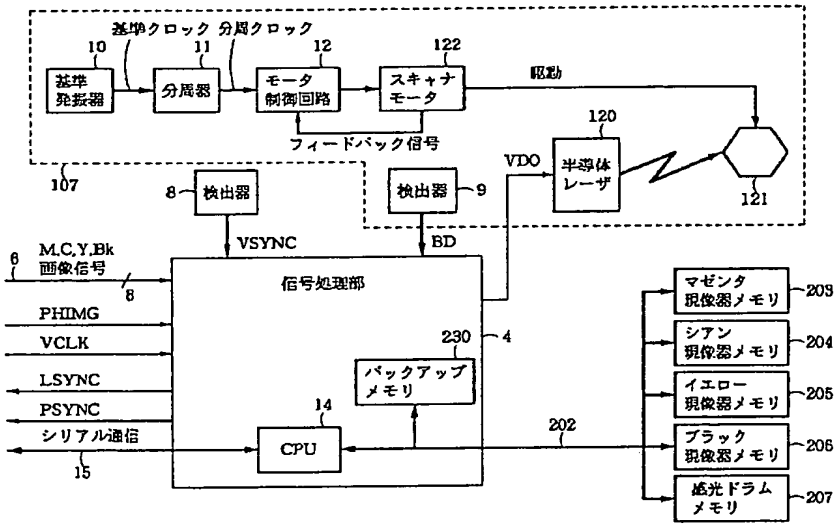
【図２】


1000 ホスト
コンピュータ
1001 ホスト
コンピュータ
1 プリンタ
2
プリンタ
コントローラ
3
プリンタ
エンジン
208
ディスプレイ
209
M,C,Y,Bk
画像信号
6
D7～D0
PHIMG
VCLK
LSYNC
PSYNC
シリアル通信
5
15

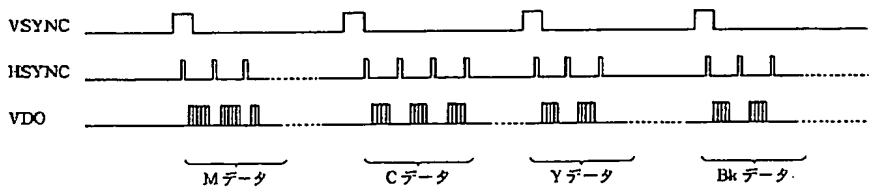
【図９】


227
229
209
228

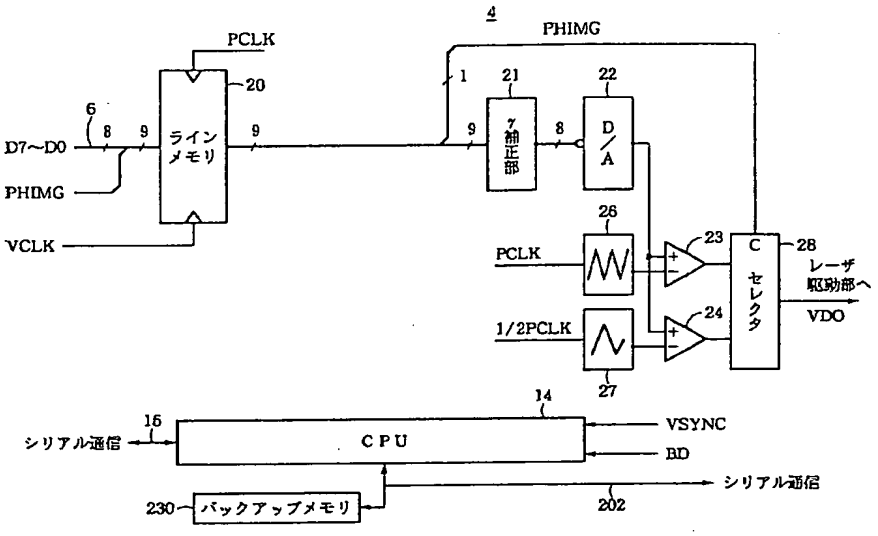
【図３】


基準クロック
分周クロック
10
基準
発振器
11
分周器
12
モータ
制御回路
122
スキャナ
モータ
駆動
フィードバック信号
107
120
半導体
レーザ
121
VDO
8
検出器
検出器
9
VSYNC
BD
6
M,C,Y,Bk
画像信号
8
PHIMG
VCLK
LSYNC
PSYNC
シリアル通信
15
信号処理部
4
230
バックアップ
メモリ
14
CPU
202
マゼンタ
現像器メモリ
203
シアン
現像器メモリ
204
イエロー
現像器メモリ
205
ブラック
現像器メモリ
206
感光ドラム
メモリ
207

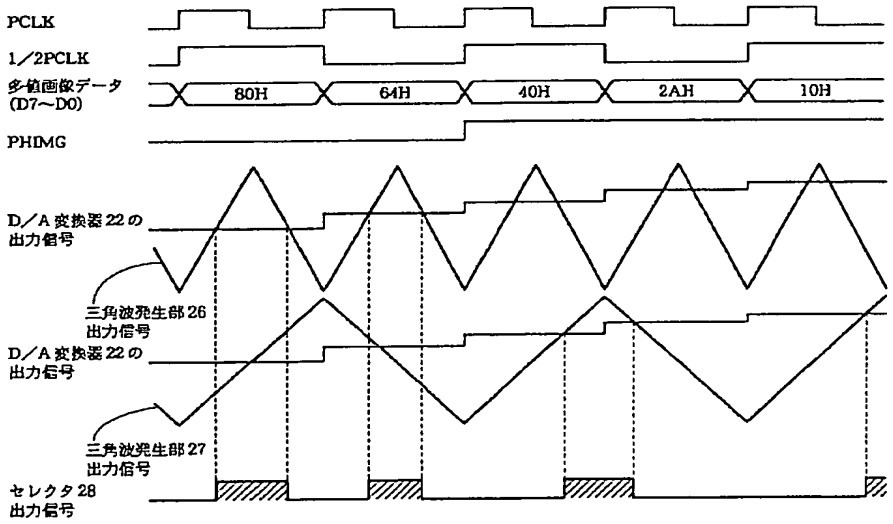
【図４】


VSYNC
HSYNC
VDO
Mデータ
Cデータ
Yデータ
Bkデータ

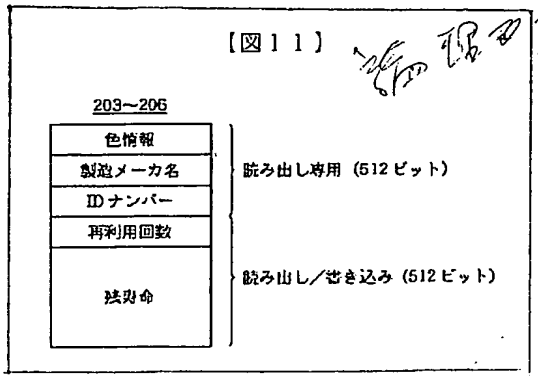
【図５】


4
PHIMG
PCLK
20
1
21
22
6
8
9
ライン
メモリ
9
9
補正部
8
D
／
A
D7～D0
PHIMG
VCLK
26
PCLK
23
C
セレクタ
28
レーザ
駆動部へ
VDO
1/2PCLK
24
27
14
15
シリアル通信
CPU
VSYNC
BD
シリアル通信
230
バックアップメモリ
202

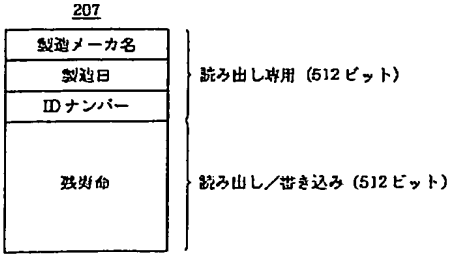
【図６】


PCLK
1／2PCLK
多値画像データ
(D7～D0)
80H
64H
40H
2AH
10H
PHIMG
D／A変換器22の
出力信号
三角波発生部26
出力信号
D／A変換器22の
出力信号
三角波発生部27
出力信号
セレクタ28
出力信号

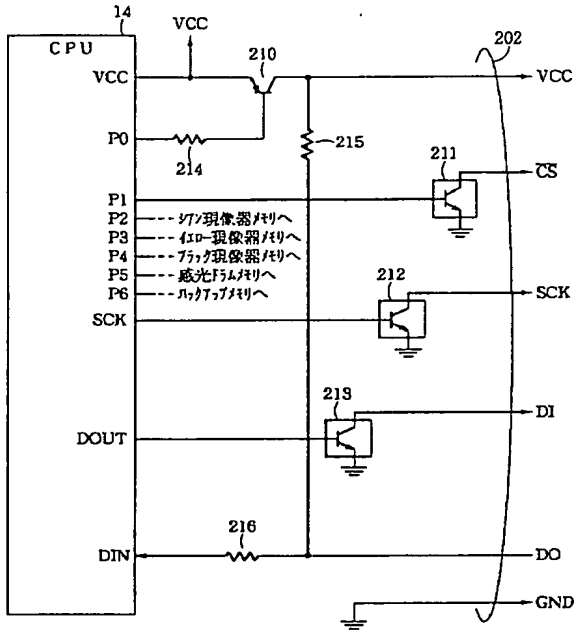
【図１１】


203～206
色情報
製造メーカ名
IDナンバー
再利用回数
残寿命
読み出し専用（512ビット）
読み出し／書き込み（512ビット）

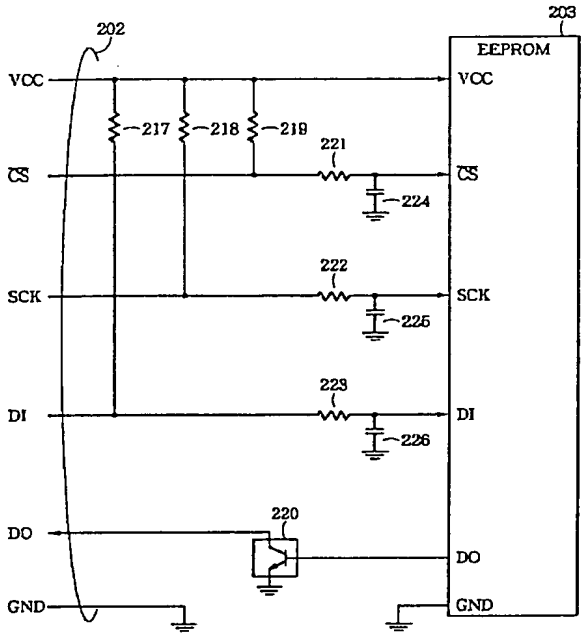
【図１２】


207
製造メーカ名
製造日
IDナンバー
残寿命
読み出し専用（512ビット）
読み出し／書き込み（512ビット）

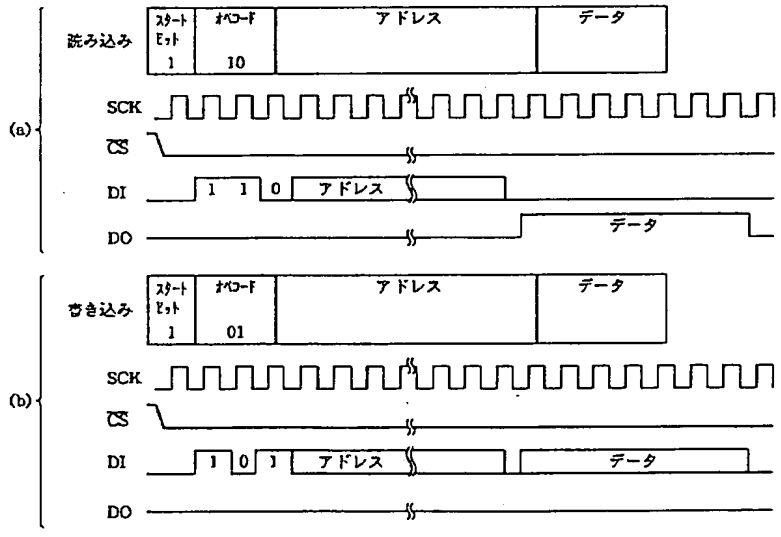
【図７】


14
CPU
VCC
P0
P1
P2
P3
P4
P5
P6
SCK
DOUT
DIN
210
214
215
216
211
212
213
202
CS
DI
DO
GND
シアン現像器メモリへ
イエロー現像器メモリへ
ブラック現像器メモリへ
感光ドラムメモリへ
バックアップメモリへ

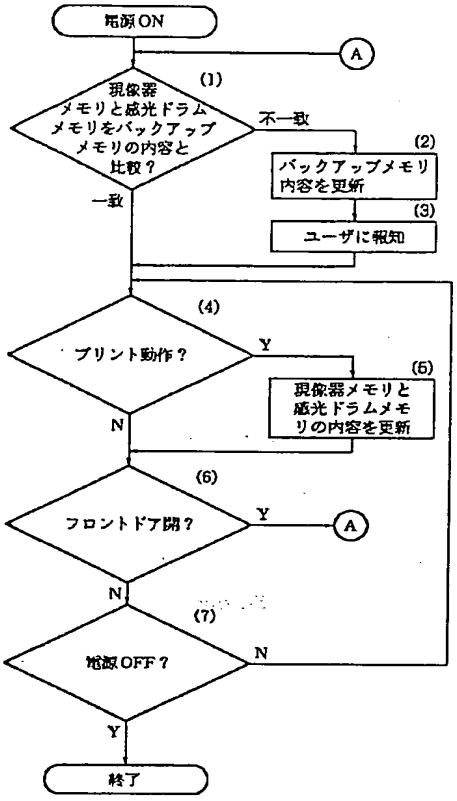
【図８】


202
203
EEPROM
VCC
CS
SCK
DI
DO
GND
217
218
219
220
221
222
223
224
225
226

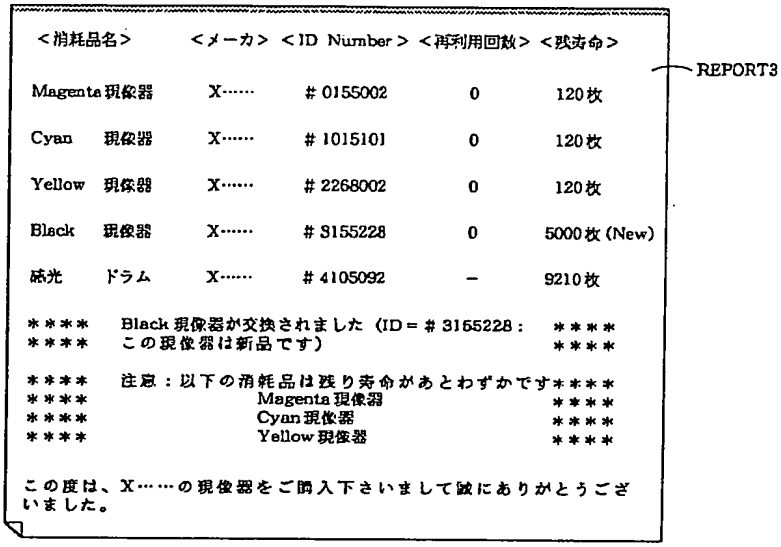
【図１０】


(a)
読み込み
スタートビット
オペコード
1
10
アドレス
データ
SCK
CS
DI
DO
1 1 0
(b)
書き込み
01
1 0 1

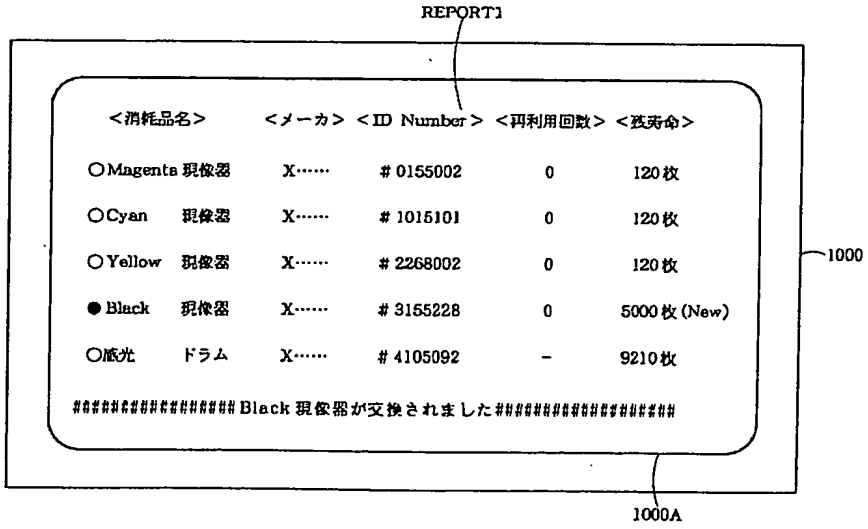
【図１３】


電源ON
A
(1)
現像器メモリと感光ドラムメモリをバックアップメモリの内容と比較？
不一致
(2)
バックアップメモリ内容を更新
(3)
ユーザに報知
一致
(4)
プリント動作？
Y
(5)
現像器メモリと感光ドラムメモリの内容を更新
N
(6)
フロントドア開？
Y
A
N
(7)
電源OFF？
N
Y
終了

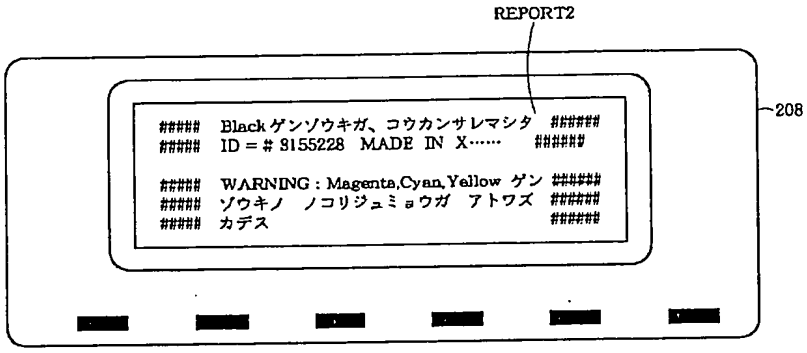
【図１６】


＜消耗品名＞　＜メーカ＞ ＜ID Number＞ ＜再利用回数＞ ＜残寿命＞
REPORT3
Magenta現像器　X……　＃0155002　0　120枚
Cyan　現像器　X……　＃1015101　0　120枚
Yellow　現像器　X……　＃2268002　0　120枚
Black　現像器　X……　＃3155228　0　5000枚(New)
感光　ドラム　X……　＃4105092　－　9210枚
＊＊＊＊　Black現像器が交換されました（ID＝＃3155228：　＊＊＊＊
＊＊＊＊　この現像器は新品です）　＊＊＊＊
＊＊＊＊　注意：以下の消耗品は残り寿命があとわずかです＊＊＊＊
＊＊＊＊　Magenta現像器　＊＊＊＊
＊＊＊＊　Cyan現像器　＊＊＊＊
＊＊＊＊　Yellow現像器　＊＊＊＊
この度は、X……の現像器をご購入下さいまして誠にありがとうございました。

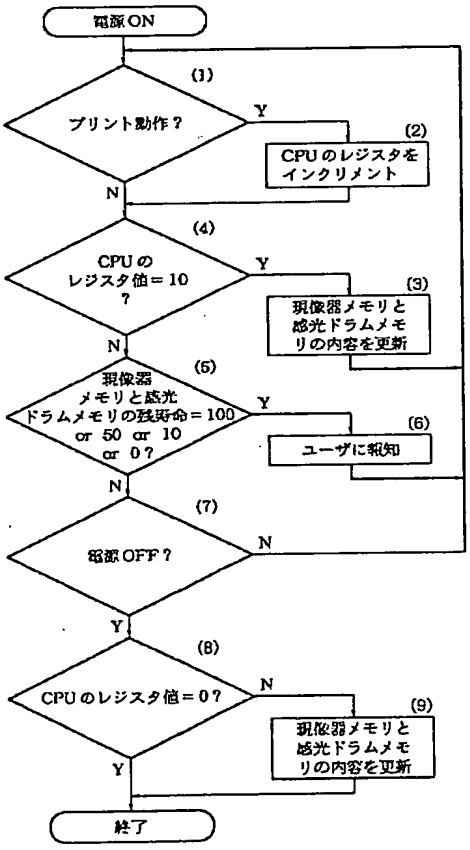
【図１４】


REPORT1
＜消耗品名＞　＜メーカ＞ ＜ID Number＞ ＜再利用回数＞ ＜残寿命＞
○Magenta現像器　X……　＃0155002　0　120枚
○Cyan　現像器　X……　＃1015101　0　120枚
○Yellow　現像器　X……　＃2268002　0　120枚
●Black　現像器　X……　＃3155228　0　5000枚(New)
○感光　ドラム　X……　＃4105092　－　9210枚
##################Black現像器が交換されました####################
1000
1000A

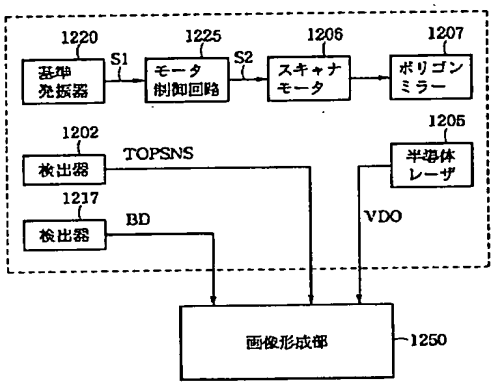
【図１５】



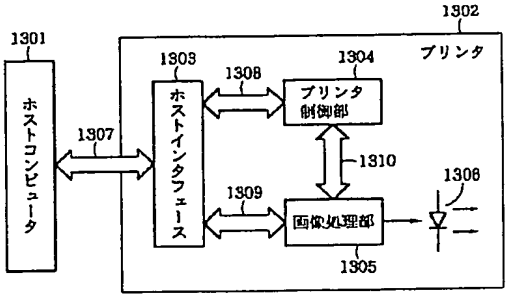

【図１７】



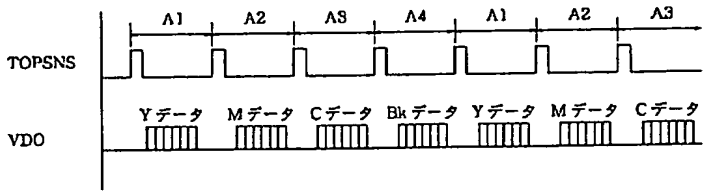

【図１９】



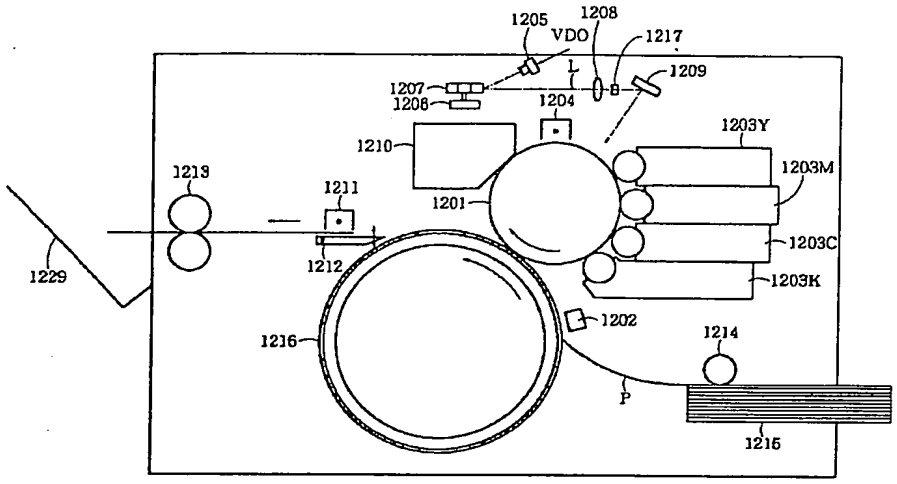

【図２１】



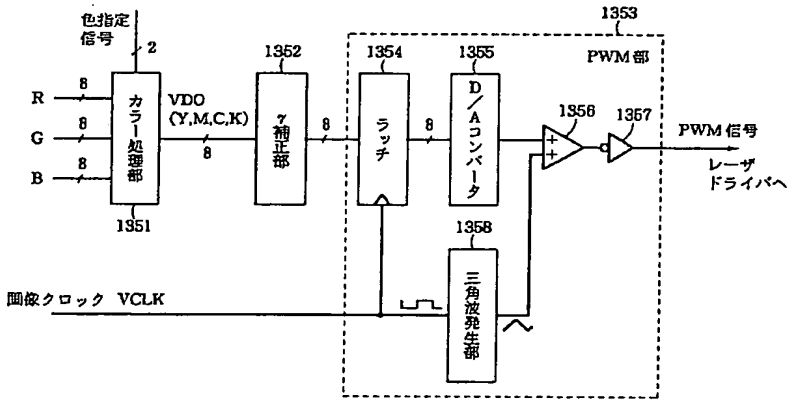

【図２０】



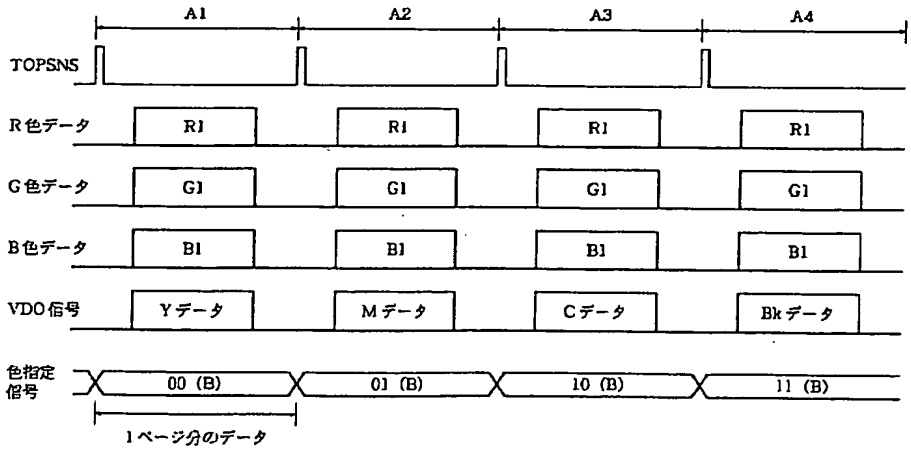
【図１８】


1205
VDO
1208
1217
1209
1207
1208
1204
1203Y
1210
1203M
1218
1211
1201
1203C
1212
1203K
1229
1202
1214
1216
P
1215

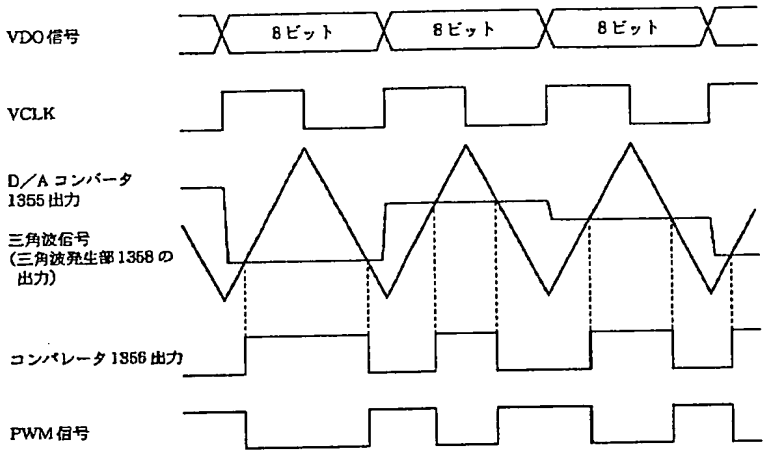
【図２２】


色指定信号
2
1353
PWM部
R
G
B
8
8
8
カラー処理部
1351
VDO (Y,M,C,K)
8
1352
γ補正部
8
1354
ラッチ
8
1355
D／Aコンバータ
1356
1357
PWM信号
レーザドライバへ
1358
三角波発生部
画像クロック VCLK

【図２３】


A1
A2
A3
A4
TOPSNS
R色データ
R1
G色データ
G1
B色データ
B1
VDO信号
Yデータ
Mデータ
Cデータ
Bkデータ
色指定信号
00 (B)
01 (B)
10 (B)
11 (B)
1ページ分のデータ

【図２４】


VDO信号
8ビット
8ビット
8ビット
VCLK
D／A コンバータ
1355 出力
三角波信号
(三角波発生部 1358 の
出力)
コンパレータ 1356 出力
PWM 信号